FINAL
ENVIRONMENTAL ASSESSMENT FOR THE EAST KERN AIRPORT DISTRICT LAUNCH SITE OPERATOR LICENSE FOR THE MOJAVE AIRPORT

Prepared for the
U.S. Department of Transportation
Federal Aviation Administration
Office of the Associate Administrator
for Commercial Space Transportation
Washington, DC 20591

February 18, 2004

This Page Intentionally Left Blank

FINAL ENVIRONMENTAL ASSESSMENT FOR THE EAST KERN AIRPORT DISTRICT LAUNCH SITE OPERATOR LICENSE FOR THE MOJAVE AIRPORT

FEDERAL AGENCY: Federal Aviation Administration (FAA), Associate Administrator for Commercial Space Transportation (AST)

STATE AGENCY: East Kern Airport District (EKAD)

PUBLIC REVIEW PROCESS: In accordance with the National Environmental Policy Act of 1969 (NEPA) the FAA initiated a public review and comment period of the Draft Environmental Assessment (EA)/Initial Study for the EKAD Launch Site Operator License for the Mojave Airport. A public meeting was held in Mojave, California on December 10, 2003 to record comments from the public. The comments were addressed in a Comment Response Document and in the Final EA as appropriate.

ABSTRACT: The Final EA for the EKAD Launch Site Operator License for the Mojave Airport addresses the environmental impacts of the proposed action of issuing a launch site operator license to the EKAD for the Mojave Airport. This launch site operator license would be for the purpose of operating a facility to launch horizontally launched, suborbital rockets. In addition, the EKAD may offer other services for commercial launch companies at the Mojave Airport including static engine firings, launch vehicle manufacturing, and other testing and manufacturing activities. These services and other testing and manufacturing activities are unrelated to, and are not authorized by the Launch Site Operator License.

Potential impacts of the proposed action on resource areas including air quality; airspace; biological resources; cultural resources; geology and soils; hazardous materials and hazardous waste management; land use; noise; socioeconomic impacts and environmental justice; transportation; visual and aesthetic resources; water resources; and secondary or induced impacts were considered in this EA. In addition, the following topics required under 1050.1 D are covered in the EA under the following sections: the analysis of Farmlands and DOT Act § 4(f) appears in the "Land Use" section, the analysis of Natural Resources and Energy and Wild and Scenic Rivers appears in the "Water Resources" section, and the Wetlands analysis appears in the "Biological Resources" section.

Cumulative impacts from the proposed action were also considered for all of the above-mentioned resource areas.

CONTACT INFORMATION: Questions regarding the proposed action and the Final EA for the EKAD Launch Site Operator License for the Mojave Airport; can be addressed to Ms. Michon Washington, Federal Aviation Administration, Office of the Associate Administrator for Commercial Space Transportation, Suite 331/AST-100, 800 Independence Avenue SW, Washington, DC 20591; e-mail Michon.Washington@faa.gov or phone (202) 267-9305.

This Page Intentionally Left Blank

Executive Summary

Introduction

Under the proposed action, the Federal Aviation Administration (FAA) would issue a launch site operator license to the East Kern Airport District (EKAD) to operate a launch facility at the Mojave Airport. The FAA may also issue launch licenses to individual operators for launches from the Mojave Airport. A launch site operator license remains in effect for five years from the date of issuance unless surrendered, suspended, or revoked before the expiration of the term and is renewable upon application by the licensee (14 Code of Federal Regulations [CFR] 420.43). A license to operate a launch site authorizes a licensee to offer its launch site to a launch operator for each launch point for the type and weight class of launch vehicle identified in the license application and upon which the licensing determination is based. Issuance of a license to operate a launch site does not relieve a licensee of the obligation to comply with any other laws or regulations, nor does it confer any proprietary, property, or exclusive right in the use of airspace or outer space (14 CFR 420.41). Two Federal agencies are involved in this proposed action, the FAA as the lead agency responsible for licensing the proposed activities at the facility and the U.S. Air Force (USAF) as a cooperating agency. The Air Force Flight Test Center (AFFTC) is the host organization at Edwards Air Force Base (AFB) that manages the special use airspace designated as Restricted Area R-2515. The R-2508 Joint Policy and Planning Board (JPPB) manages other joint use airspace within the R-2508 Complex. The R-2508 Complex Control Board represents the JPPB in exercising supervisory management of the R-2508 Complex. The AFFTC and the R-2508 Complex Control Board would allow the vehicles launched from the Mojave Airport to operate in airspace that they each manage. The AFFTC also operates the runway and airfield that would serve as the primary emergency landing site for the launches. These entities also have responsibility for the environment and assets on the ground, which have the potential to be affected by launches. Therefore, the FAA requested and the USAF agreed to participate as a cooperating agency in the preparation of NEPA analysis for this proposed action.

Issuing a launch site operator license is considered a Federal action and is subject to review as required by the National Environmental Policy Act (NEPA) of 1969 (Public Law 91-190), as amended, 42 United States Code (U.S.C.) § 4321, et seq. The FAA will be the lead Federal Agency for the NEPA process and the USAF will be a cooperating agency on this proposed action.

Because this proposed action would take place in California, it is also necessary for the requirements of the California Environmental Quality Act (CEQA) to be met in the environmental analysis. The EKAD owns and operates the Mojave Airport and must comply with CEQA to operate a launch facility at the Mojave Airport. The EKAD will be the lead agency for the CEQA process. The EKAD has determined that this Environmental Assessment (EA) will also serve as the Initial Study for CEQA. The Initial Study is prepared to determine whether it is necessary to prepare an Environmental Impact Report (EIR) or a Negative Declaration. In this instance, EKAD determined that

it was appropriate to prepare a Negative Declaration, which was adopted by the EKAD Board of Directors on December 16, 2003.

Purpose and Need

The Mojave Airport would serve as an alternative location to Federal facilities or other commercial sites for launching horizontally launched, suborbital vehicles. The Mojave Airport already serves as a location to test aircraft and this would allow the EKAD to offer the Mojave Airport to existing customers wishing to conduct launch operations. These operations may include for-profit launch services. For-profit launch services may include tourism activities, selling merchandise flown in the vehicle, or other activities. These activities are consistent with the objectives of the Commercial Space Launch Act.

Description of Proposed Action/Preferred Alternative

The EKAD has identified two types of launch vehicles, identified in this analysis as Concept A and Concept B, which would be typical of the vehicles that would operate from the Mojave Airport. The proposed action/preferred alternative would include launches of both Concept A and Concept B launch vehicles. The potential users of the launch site would be responsible for obtaining any necessary permits or approvals including a launch license from the FAA for specific missions. The FAA may use the analysis in this document as the basis for an environmental determination of the impacts of these launches to support subsequent licensing decisions for the launch of specific launch vehicles from the Mojave Airport.

The activities included in this analysis are the launch of suborbital rockets as described in Concept A and Concept B, and the testing of rocket engines. The FAA does not license specific vehicles or the ground tests of rocket engines, only launches of vehicles and the operation of launch and reentry sites. The environmental impacts of the engine tests at the Mojave Airport are included in this document because they are related activities.

No construction activities are proposed as part of the action. Existing infrastructure including hangars and runways would be used to support proposed launch and landing operations at the site. Existing rocket engine test stands may also be used for static tests of rocket engines. Engines that are tested would be incorporated into vehicles that are launched from the Mojave Airport, or they would be incorporated into vehicles that are launched at other facilities.

The scope of this analysis considers the use of the Mojave Airport for launch of horizontally launched Concept A and Concept B vehicles, into suborbital trajectories and their landing, and static tests of engines.

Description of Alternatives and No Action

The FAA considered two alternatives to the proposed action in this EA. The first alternative would be to issue a launch site operator license to the EKAD for the Mojave

Airport for inclusion of launch vehicles specifically fitting the description of Concept A. The second alternative would be to issue a launch site operator license to the EKAD for the Mojave Airport for inclusion of launch vehicles specifically fitting the description of Concept B.

Under the no action alternative, the FAA would not issue a launch site operator license and there would be no commercial launches from the Mojave Airport. The EKAD would not be able to operate a commercial launch facility at the Mojave Airport. The Mojave Airport facility would continue to be available for existing aviation and testing activities. Under the no action alternative, there would be no change to existing conditions at the airport.

Environmental Consequences

This section summarizes the conclusions of the analyses made for each of the resource areas considered.

Safety and Health. A hazard analysis is a necessary part of the Mission and Safety Review for the FAA licensing determination to assess the possible hazards associated with proposed ground, flight, and landing operations. Launches of Concept A and B vehicles from the Mojave Airport would require launch specific licenses from the FAA and each launch applicant would be required to conduct risk analyses based on the proposed mission profiles. The Mission and Safety Review would consider these analyses, and, therefore, they will not be discussed in detail in this EA. However, analysis of the safety and health implications of launch related operations and activities that have the potential for environmental impact are considered in this EA.

Ground operations involved in servicing and preparing the launch vehicle typically involve industrial activities. There are various hazards associated with these activities including

- Spill/fire/explosion of propellant/fuel storage, transport, handling, and loading;
- Traffic accidents due to increased activity on and off site; and
- Occupational mechanical accidents.

There would be some vapors of various propellants released from propellant storage/transfer operations through evaporative losses. However, such vapors would be vented outside and at a height that would provide adequate protection for personnel, buildings and the environment. Also, the total quantity of emissions would not occur as a large acute (short term) exposure, but would occur as a slow vapor release over a long period of time. There is also the concern of spills of propellants during handling and loading operations and subsequent fire or explosion. However, the Mojave Airport has established practices and procedures to handle the spills and releases of propellants.

Increased road traffic that would result from conducting the proposed launch operations at the Mojave Airport would only add a few cars/trucks above existing traffic loads.

However, the increase in the number of shipments of hazardous materials should not significantly increase the number of traffic accidents on the roadways around the Mojave Airport.

On-site work associated with the conduct of launch operations would be similar to that associated with industrial chemical operations. Exposure to mechanical accidents should not differ significantly from current levels for the Mojave Airport because the number of operations associated with the conduct of launch operations would be relatively small given the number of operations airport wide.

In a catastrophic accident, it would be likely that the crew would be seriously injured or killed. At the Airport, the on-site fire department could respond, secure the site, but would stay clear of the immediate area until the danger of explosions diminishes. It is expected that any fires resulting from a failure could be fought by the fire department. Additional off-site emergency response capability could also be used if necessary.

Air Quality. Under Federal law, it would be necessary to conduct a conformity analysis for criteria pollutants that do not meet Federal attainment standards. Eastern Kern County is in Federal serious non-attainment for ozone. A Federal agency cannot support an action (e.g., fund, license) unless the activity will conform to the EPA-approved State Implementation Plan for the region. This is called a conformity determination or analysis. A conformity analysis may involve performing air quality modeling and implementing measures to mitigate the air quality impacts. The Federal government is exempt from the requirement to perform a conformity analysis if two conditions are met.

- The ongoing activities do not produce emissions above the de minimis levels specified in the rule.
- The Federal action must not be considered a regionally significant action. A Federal action is considered regionally significant when the total emissions from the action equal or exceed 10 percent of the air quality control area's emissions inventory for any criteria pollutant.

However, the proposed action would not increase the levels above de minimis levels and a Federal conformity analysis would not be triggered. None of the emissions are expected to expose the nearby population or sensitive receptors to substantial pollutant concentrations. Also, the emission products should not expose the population to objectionable odors of types that do not already exist from airport operations (e.g., fuel and exhaust odors).

Airspace. No significant impacts to Mojave Airport airspace would occur as a result of the proposed action. The additional operations that are part of the proposed action would represent an increase in activity of 0.3 percent. This increase would not exceed the capabilities of the Mojave Airport facilities and control tower and would not result in a significantly higher probability of in-flight mishaps. No significant impacts to off-site airspace would occur as a result of the proposed action. The proposed action would occur almost exclusively in the R-2508 Complex. However, any flights into the

R-2508 Complex that are part of the proposed action that would create a significant impact to military activities would be prohibited by the scheduling and controlling agencies. Thus, the proposed action would not result in long-term changes to military operations or training within restricted airspace.

Biological Resources. No development activities are planned and therefore, adverse effects to vegetation, including Joshua trees and creosote scrub, are not anticipated. Although the designated abort sites include areas where sensitive habitat and species may be present, the probability of emergency landings at these sites is low, and therefore significant impacts to vegetation found at these sites would not be anticipated. The proposed action would not have a substantial adverse effect on any riparian habitat or other sensitive natural community because such areas have not been identified on or near the airport.

The Mojave Airport has been identified as being part of an "urbanized, non-sensitive" area where a biological survey would not be required. The desert tortoise and Mohave ground squirrel, historically occurred throughout the Region of Influence (ROI) and have limited potential to occur almost anywhere within the ROI. If a desert tortoise or Mohave ground squirrel were discovered at the airport, personnel would follow appropriate U.S. Fish and Wildlife Service and State of California Department of Fish and Game protocols to ensure their protection. The FAA contacted the U.S. Fish and Wildlife Service to initiate informal consultation under Section 7 of the Endangered Species Act. After review of potential impacts, the FAA determined that the proposed action is not likely to adversely affect listed species or critical habitat and the U.S Fish and Wildlife Service concurred.

The brief sonic boom noise events associated with the flight of Concept A or B vehicles could elicit a short-term startle response in wildlife but no long-term adverse impacts are expected.

Cultural Resources. Potential impacts to cultural resources would be associated generally with the noise produced during flights and could include physical damage to buildings, structures or rock features through accident or vibration, visual or audible impacts to the setting of cultural resources, and disturbance of traditional activities, such as religious ceremonies or subsistence hunting.

The breakup of the Concept A or B vehicles during a crash and subsequent recovery activities could directly impact cultural resources on the ground. These resources may be located above or below ground and may be known or unknown resources. If falling debris hit specific assets on the ground, those resources would likely be destroyed. Crash cleanup activities could also disturb nearby resources. However, because the probability of a crash is extremely low, and cultural resources are widely dispersed throughout the region, it is unlikely that debris would impact a cultural site. If any site were discovered, the State Historic Preservation Office would be notified and any protocols to ensure protection would be followed. Based on the FAA's review of the proposed action under Section 106 of the National Historic Preservation Act, the FAA determined that the

project would have no adverse effect on historic properties. The SHPO concurred with the FAA's determination and the consultation was concluded.

Geology and Soils. The breakup of Concept A or B vehicles during a crash and subsequent recovery activities could directly impact geology or soils. However, because the probability of a crash is extremely low, it is unlikely that debris or residual propellant would significantly impact geology or soils. The proposed action would not result in a loss of known mineral resources or result in the loss of availability of a locally important mineral resource recovery site identified in a land use plan. The proposed action would not change the ground surface and would have no impact on existing landslide and erosion risk. The Mojave Airport is outside the 100-year flood plain.

Hazardous Materials and Hazardous Waste Management. For both Concept A and B vehicles, the primary hazardous materials used would be propellants. All propellants and other hazardous materials would be stored and used in compliance with regulations applicable to their storage and use, and already in place at Mojave Airport. No adverse impacts would be anticipated from these additional hazardous materials.

Land Use. No significant impacts to land use would occur as a result of the proposed action. The proposed action does not include any construction, additions, or modifications to the airport facilities that would physically divide an established community. Therefore, the proposed action would not result in a conflict with an applicable land use, habitat conservation, or natural community conservation plan.

No farmlands or agricultural use lands are located on the Mojave Airport; farmlands in the ROI already experience flyovers of aircraft similar in size, power, and noise level to those already using the Mojave Airport. The noise impacts on sensitive land uses is addressed in the noise analysis. The vehicles would pass over any farmland areas at an altitude that would have no significant impacts. No prime farmland, unique farmland, farmland of state importance, or general farmland would be converted to a non-agricultural use as a result of the proposed action. No conflicts with existing agricultural uses or Williamson contracts would occur as a result of the proposed action.

No parks or recreational facilities are located on the Mojave Airport. The proposed action would not result in the physical deterioration of park or recreational facilities in the off-site ROI. The proposed action would not require the construction or expansion of recreational facilities that would have an adverse effect on the environment.

Noise. No significant impacts to noise levels at the Mojave Airport would occur as a result of the proposed action. Approximately 1,226 jet aircraft takeoff and land at the Mojave Airport annually. The Mojave Airport would be exposed to a total of 4.4 minutes per week of additional high intensity noise level of 90 dB under the proposed action. The total time of additional high intensity noise levels is likely overestimated due to conservative assumptions of launch vehicles and launch time periods. In addition, the noise source would be moving and the impacts to a particular location would only be a fraction of the total time.

The Mojave community currently experiences high noise levels from military jet takeoffs and landings and stationary rocket tests. Sensitive receptors in the Mojave community such as schools and residential areas already experience high intensity noise levels above 90 dBA. An additional 4.4 minutes per week of high intensity noise levels would not cause significant impacts to sensitive receptors and would not elevate the average noise level above the acceptable levels of 65 CNEL or 65 L_{dn}. (Kern County, 2003c)

The predicted overpressure at ground level for sonic booms produced by Concept A and B vehicles flying at approximately 21,341 to 24,390 meters (70,000 to 80,000 feet) above mean sea level would be approximately 5.86 kilograms per square meter (1.2 pounds per square foot). Launches from the Mojave Airport would only occur during daytime hours. Ten daytime sonic booms of 4.88 kilograms per square meter (1 pound per square foot) everyday for a year would yield an L_{dn} of 65 dBA. An L_{dn} of 65 dBA is the accepted level for outdoor noise levels related to transportation. The maximum overpressure expected from the proposed action would be greater than 4.88 kilograms per square meter (1 pound per square foot), but only 1.1 sonic booms per week would occur.

This would make the impacts from the sonic booms equal to or less than the acceptable 65 dBA level for outdoor noise levels related to transportation. In addition, the Mojave Airport currently experiences sonic boom noise exposure from supersonic military jets and supersonic Space Shuttle testing at Edwards AFB.

The noise levels in the Mojave community associated with sonic booms would be less than 65 dBA L_{dn} and less than 65 dBA CNEL. The entire Mojave community including sensitive receptors currently experiences sonic boom noise exposure from aircraft operating in the R-2508 Complex. The proposed action would not constitute a significant increase in noise level to the community.

Annoyance created by sonic booms is a function of boom intensity, number of booms per time period, attitude of the population, and the activity in which people were engaged in at the time of the boom. There is no precise relationship between the parameters. A noise study found that 10 percent of subjects exposed to 10 to 15 booms per day were annoyed at an overpressure of one pound per square foot and that this reached nearly 100 percent at three pounds per square foot. However, people may be more sensitive when exposed to numerous booms per day, while prior experience with sonic booms (such as people who live on an Air Force Base) seems to lower sensitivity. Other studies indicate that there is a wide range in estimating percent annoyed ranging from 10 percent to 70 percent at one pound per square foot and 55 percent to approximately 100 percent at three pounds per square foot.

Socioeconomic Impacts and Environmental Justice. Since no new development would be required to support the proposed action, and only existing personnel would be used to conduct launch activities, the proposed action would not induce substantial changes in the population, employment, demand for housing, or infrastructure in the community of Mojave. Since the proposed action does not involve an influx of workers to the Mojave Airport, under normal launch and landing procedures, additional on- or off-site public or

emergency services, including firefighters, security, or medical services would not be required.

Since no construction activities would be required to issue a launch site operator license to EKAD for the Mojave Airport and only existing personnel would be used to conduct launch activities, the proposed action would not have an impact on the health or environment of minority or low-income populations located at or near the airport. Both Concept A and Concept B launch vehicles could cause sonic booms, which could impact local communities, including environmental justice groups. Noise levels generated during sonic booms would be short-term in nature and overall predicted noise levels would not exceed ambient noise levels in residential areas.

Transportation. The Mojave Airport is located at the crossroads of major north-south and east-west roadways. The small number of additional passenger vehicles and delivery trucks anticipated as part of the proposed action would not increase traffic congestion or cause a decline in the Level of Service.

Visual and Aesthetic Resources. Concept A and B launch vehicles would resemble traditional airplanes while in flight, and the visual landscape already includes airplanes in flight. Both Concept A and B launch vehicles would leave visible contrails, but they would be similar in visual impact to contrails from existing flight operations. Because this area is already used for takeoffs and landings of airplanes, the visual sensitivity is low. The proposed action would not substantially degrade the existing visual character or quality of the site and its surroundings and would have no adverse effect on a scenic vista or scenic resources, as there are none in the area.

Water Resources. No significant impacts to on-site or off-site water resources would occur as a result of the proposed action. The proposed action would not cause impacts to existing drainage patterns that would result in increased erosion, siltation, or on-site flooding. The proposed action would not involve the generation of additional storm water or of additional sources of pollutants that could be washed away during storm events. The existing storm water system and permit would be adequate for the proposed action. Because no construction or expansion to the existing facilities would occur, the proposed action would not substantially deplete ground water supplies either on- or off-site or interfere with ground water recharge such that there would be a net deficit in aquifer volume or a lowering of the local ground water table. In the event of a catastrophic accident, debris, wreckage, or unused propellant could impact drainage patterns, storm water flows, or ground water. But, the small size of the proposed vehicles and the low probability of a catastrophic event would make the impacts insignificant. Extensive emergency response and clean-up procedures would further reduce the magnitude and duration of any impacts.

Cumulative Impacts. The proposed action would not exceed de minimis levels for criteria pollutants and the percent of the air quality control areas emissions inventory for any criteria pollutant. Total CO_2 emissions from all sources in the U.S. were 5,159 million metric tons (5,687 million tons) in 1994. The proposed action would account for

an increase of only a fraction (less than 0.000002%) of these CO_2 emissions. Consequently, the total expected CO_2 emissions from the proposed action would be insignificant. There would be no emissions that directly affect ozone depletion. Therefore, no significant cumulative impacts to air quality are expected.

Because of the volume of air traffic that utilizes this area already and the structured scheduling procedures in place for joint-use of the R-2508 Complex, the proposed action would have no significant cumulative effects on airspace.

Ten daytime sonic booms of 4.88 kilograms per square meter (1 pound per square foot) everyday for a year would yield an L_{dn} of 65 dBA. (DoD, 2002a) An L_{dn} of 65 dBA is the accepted level for outdoor noise levels related to transportation. In the EA for the Orbital Reentry Corridor for Generic Unmanned Lifting Entry Vehicle Landing at Edwards AFB, the USAF considered up to 12 flights per year. Currently an average of two military jet aircraft take off and/or land at the Mojave Airport per day. These military aircraft are capable of producing sonic booms. Even in the worst case scenario, i.e., one launch from the Mojave Airport, one launch of the proposed generic unmanned lifting entry vehicle from Edwards AFB, and two jet aircraft take offs or landings from the Mojave Airport, there would not be more than 10 sonic booms generated per day in the ROI. Therefore, there would be no significant cumulative impacts to noise from the proposed action.

No significant cumulative impacts to biological, cultural, geologic, mineral, visual and aesthetic, or water resources would occur as a result of the proposed action. No significant cumulative impacts would result from hazardous materials or hazardous waste used or produced as a result of the proposed action. No significant cumulative impacts to land use, socioeconomics, environmental justice, or transportation would occur as a result of the proposed action.

Detailed analyses of safety and related issues would be addressed in the FAA's Mission and Safety Review prior to issuing a launch license. However, safety and health analyses of operations that have the potential for environmental impact were considered in the EA and were determined to have no significant cumulative impacts on the environment.

Although the proposed action would support and facilitate limited growth, it would not induce growth. Additionally, there would be no specific future development activities currently known that would be dependent on the proposed action. Therefore no secondary impacts are expected to result from the proposed action.

This Page Intentionally Left Blank

Table of Contents

This Page Intentionally Left Blank

ACRONYMS

ACEC	Area of Critical Environmental Concern
AFB	Air Force Base
AFFTC	Air Force Flight Test Center
AGL	Above Ground Level
ALUCP	Airport Land Use Compatibility Plan
ARFF	Aerospace Rescue Fire Fighting
ARTCC	Air Route Traffic Control Center
AST	Associate Administrator for Commercial Space Transportation
ATC	Air Traffic Control
ATCAA	Air Traffic Control Assigned Airspace
AVEK	Antelope Valley-East Kern
BLM	Bureau of Land Management
C	Celsius
CAA	Clean Air Act
CARB	California Air Resources Board
CCF	Central Coordinating Facility
CDCA	California Desert Conservation Area
CDFG	California Department of Fish and Game
CDP	Census Designated Place
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CNEL	Community Noise Equivalent Level
CO	carbon monoxide
CO_2	carbon dioxide
CSLA	Commercial Space Launch Act
CTN	Case, Throat and Nozzle
dB	Decibel
dBA	A-weighted Decibel
DoD	Department of Defense
DOT	Department of Transportation
EA	Environmental Assessment
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EKAD	East Kern Airport District
EMS	Emergency Medical Services
ENA	Environmental Noise Assessment
EPA	Environmental Protection Agency
F	Fahrenheit
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations

FEMA	Federal Emergency Management Agency
FL	Flight Level
FONSI	Finding of No Significant Impact
FSS	Flight Safety System
H_2	hydrogen
H_2O	water
HC	hydrocarbon
HI-DESERT TRACON	High Desert Terminal Radar Approach Control
HS	hydrogen sulfide
HTPB	hydroxyl-terminated polybutadiene
IAS	Indicated Air Speed
IFR	Instrument Flight Rules
JPPB	Joint Policy and Planning Board
KCAPCD	Kern County Air Pollution Control District
L_{dn}	Day/Night Average Sound Level
LEV	Lifting Entry Vehicle
L_{max}	Maximum Noise Level
LOA	Letter of Agreement
LOS	Level of Service
LO_X	Liquid Oxygen
LSAIP	Launch Site Accident Investigation Plan
MOA	Military Operations Area
MONODS	Mobile Nitrous Oxide Delivery System
MPUD	Mojave Public Utility District
MSL	Mean Sea Level
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NAS	National Airspace System
NASA	National Aeronautics and Space Administration
National Register	National Register of Historic Places
NAWS	Naval Air Weapons Station
NEPA	National Environmental Policy Act
NFPA	National Fire Protection Administration
NO_2	nitrogen dioxide
NO_X	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NTPS	National Test Pilot School
OCST	Office of Commercial Space Transportation
OHV	Off-Highway Motor Vehicle
OSHA	Occupational Safety and Health Administration
Pb	Lead
PCC	Primary Compatibility Criteria
PEIS	Programmatic Environmental Impact Statement
PEIS CRV	Programmatic Environmental Impact Statement for Commercial Reentry Vehicles

PEIS LL	Programmatic Environmental Impact Statement for Licensing Launches
PIC	Pilot in Command
PM	Particulate Matter
ppm	parts per million
RCRA	Resource Conservation and Recovery Act
RLV	Reusable Launch Vehicle
ROI	Region of Influence
SEL	Sound Exposure Level
SENEL	Single Event Noise Exposure Level
SIP	State Implementation Plan
SO_2	sulfur dioxide
SO_X	sulfur oxides
SPCC	Spill Prevention Control and Countermeasures
SPORT	Space Positioning Optical Radar Tracking
SR	State Route
SWP	State Water Project
U.S.	United States
USAF	United States Air Force
U.S.C.	United States Code
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
VFR	Visual Flight Rules
VOC	Volatile Organic Compound

This Page Intentionally Left Blank

1. Introduction

The East Kern Airport District (EKAD) manages the Mojave Airport, a general aviation airport located in Mojave, California, and proposes to operate a launch site for horizontally launched, suborbital, reusable launch vehicles (RLVs). To conduct commercial launch operations, the EKAD must obtain a license from the Federal Aviation Administration (FAA). Individual launch operators must also obtain a license from the FAA to conduct launches from licensed sites.

Under the proposed action, the FAA would issue a launch site operator license for the EKAD to operate a launch facility at the Mojave Airport. The FAA may also issue a launch license to individual operators for launches from the Mojave Airport. A launch site operator license remains in effect for five years from the date of issuance unless surrendered, suspended, or revoked before the expiration of the term and is renewable upon application by the licensee (14 Code of Federal Regulations [CFR] 420.43). A license to operate a launch site authorizes a licensee to offer its launch site to a launch operator for each launch point for the type and weight class of launch vehicle identified in the license application and upon which the licensing determination is based. Issuance of a license to operate a launch site does not relieve a licensee of its obligation to comply with any other laws or regulations, nor does it confer any proprietary, property, or exclusive right in the use of airspace or outer space (14 CFR 420.41).

Individual launch operators proposing to launch vehicles from the Mojave Airport would need to apply for a launch license from the FAA. There are two types of RLV mission licenses described in 14 CFR § 431.3. "A mission-specific license authorizing an RLV mission authorizes a licensee to launch and reenter, or otherwise land, one model or type of RLV from a launch site approved for the mission to a reentry site or other location approved for the mission. A mission-specific license authorizing an RLV mission may authorize more than one RLV mission and identifies each flight of an RLV authorized under the license. A licensee's authorization to conduct RLV missions terminates upon completion of all activities authorized by the license or the expiration date stated in the reentry license, whichever comes first. An operator license for RLV missions authorizes a licensee to launch and reenter, or otherwise land, any of a designated family of RLVs within authorized parameters, including launch sites and trajectories, transporting specified classes of payloads to any reentry site or other location designated in the license. An operator license for RLV missions is valid for a two-year renewable term."

Two Federal agencies are involved in the proposed action, the FAA as the lead agency responsible for licensing the proposed activities at the facility and the U.S. Air Force (USAF) as a cooperating agency. The Air Force Flight Test Center (AFFTC) is the host organization at Edwards AFB that manages the special use airspace designated as Restricted Area R-2515. The AFFTC would allow the vehicles launched from the Mojave Airport to operate in R-2515.

Issuing a launch site operator license is a Federal action and is subject to review as required by the National Environmental Policy Act (NEPA) of 1969 (Public Law 91-190), as amended, 42 United States Code [U.S.C.] § 4321, et seq. The FAA will be the

lead Federal Agency for the NEPA process and the USAF will be a cooperating agency on this proposed action. FAA Order 1050.1 D, *Policies and Procedures for Considering Environmental Impacts*, describes the FAA's procedures for implementing NEPA. Specifically, FAA Order 1050.1 D requires that the FAA decision-making process facilitate public involvement by including consideration of the effects of the proposed action and alternatives; avoidance or minimization of adverse effects attributable to the proposed action; and restoration and enhancement of resources, and environmental quality of the nation. These requirements will be considered in the FAA's licensing decision. The FAA must also consider all appropriate environmental laws.

The FAA is responsible for determining the type of NEPA analysis that is appropriate for each project. For this proposed action, the FAA has determined that an Environmental Assessment (EA) is appropriate. Per FAA Order 1050.1 D, since a decision had not been made to prepare an Environmental Impact Statement (EIS), and the proposed action had not been classified or identified under a Categorical Exclusion, an EA was prepared. An EA is designed to briefly provide sufficient evidence and analysis for determining whether to prepare an EIS or a Finding of No Significant Impact (FONSI). If it were determined from the EA that the proposed action poses a major impact significantly affecting the quality of the human environment, the responsible official would prepare a Draft EIS. If it were concluded that the action does not pose a major impact significantly affecting the quality of the human environment, the responsible official would prepare a FONSI.

Because this proposed action would take place in California, it is also necessary for the requirements of the California Environmental Quality Act (CEQA) to be met in the environmental analysis. CEQA was enacted in 1970 as a system of checks and balances for land-use development and management decisions in California. The EKAD owns and operates the Mojave Airport and must comply with CEQA to operate a launch facility at the Mojave Airport. The EKAD will be the lead agency for the CEQA process. The EKAD determined that the Draft EA was appropriate to serve as the Initial Study under CEQA. The Initial Study is prepared to determine whether it is necessary to prepare an Environmental Impact Report (EIR) or a Negative Declaration. In this instance, EKAD determined that it was appropriate to prepare a Proposed Negative Declaration, which was adopted on December 16, 2003 by the EKAD Board of Directors.

The FAA will cooperate with State and local agencies to the fullest extent possible to reduce duplication between NEPA and CEQA requirements. According to the Council on Environmental Quality (CEQ), where State laws or local ordinances have environmental requirements in addition to but not in conflict with those in NEPA, Federal agencies will cooperate in fulfilling these requirements as well as those of Federal laws so that one document will comply with all applicable laws. To better integrate environmental analyses into State and local planning processes, analyses will discuss any inconsistency of a proposed action with any approved State or local plan and laws (whether or not federally sanctioned). Where an inconsistency exists, the environmental analysis should describe the extent to which the Federal agency would reconcile its proposed action with the plan or law.

CEQA regulations state that where possible, agencies should try to prepare a combined CEQA EIR-NEPA EIS or CEQA Negative Declaration-NEPA FONSI to avoid duplication between different levels of government. State and local agencies should cooperate with Federal agencies to the fullest extent possible to reduce duplication between CEQA and NEPA. Cooperative efforts should include the following

- Planning processes,
- Environmental research and studies,
- Public hearings, and
- Environmental documents.

In addition to the environmental review and determination, a launch site operator license applicant must complete a policy review and approval, safety review and approval, payload review and determination, and a financial responsibility determination. The purpose of the Policy Review and Approval process is to determine whether or not the information in the license application presents any issues affecting U.S. national security or foreign policy interests, or international obligations of the U.S. The purpose of the Safety Review and Approval process is to determine whether an applicant can safely conduct the launch of the proposed launch vehicle(s) and any payload(s). The purpose of the Payload Review and Determination is to determine whether a license applicant or payload owner or operator has obtained all required licenses, authorizations, and permits. The purpose of the Financial Responsibility Determination is to ensure that all commercial licensees demonstrate financial responsibility to compensate for the maximum probable loss from claims by a third party for death, bodily injury, or property damage or loss resulting from an activity carried out under the license; and the United States Government against a person for damage or loss to government property resulting from an activity carried out under the license. All of these reviews, including the environmental review, must be completed prior to issuing a license. All FAA safety analyses would be conducted separately and would be included in the terms and conditions of the license. Air Traffic Airspace Management at the FAA must assess the proposed action in terms of potential impacts to the FAA airspace management to ensure safe and efficient operation of the National Airspace System (NAS).

The Role of the FAA

In 1984, the Department of Transportation (DOT) was designated as the lead agency for U.S. commercial launch activities by Executive Order of the President. Later that year, Congress enacted the *Commercial Space Launch Act* of 1984 (CSLA), as amended, codified at 49 U.S.C. Subtitle IX, Ch. 701, *Commercial Space Launch Activities*, which authorized DOT to regulate U.S. commercial launch activities. The DOT designated the Office of Commercial Space Transportation (OCST) within the office of the Secretary of Transportation, as the lead to carry out these responsibilities. Under the Executive Order and the CSLA, DOT OCST had dual responsibilities

1. To license and regulate all U.S. commercial launch activities to ensure that they are conducted safely and responsibly, and

2. To promote, encourage, and facilitate the growth of the U.S. commercial space transportation industry.

In November 1995, as part of a reorganization of the DOT, the OCST was transferred to the FAA. Within the FAA, the OCST was redesignated as the Associate Administrator for Commercial Space Transportation with the office designation AST. In October 1998, Congress enlarged AST's role in the oversight of commercial space launch activities to include licensing of reentries and reentry sites.

AST's mission is to ensure protection of the public, property, and national security and foreign policy interests of the U.S. during a commercial launch or reentry activity and to encourage, facilitate, and promote U.S. commercial space transportation. AST's mission is accomplished through both the regulation of commercial space launch and reentry activities and the promotion of industry growth. Low-cost, reliable access to space is the foundation on which many other commercial and strategic applications of space technology are based. The benefits and spin-offs from these technologies contribute to almost every aspect of the ability of the U.S. to remain at the forefront of world technology development and economic prosperity.

Commercial launch companies have historically based their launch operations at Federal launch ranges operated by the Department of Defense (DoD) or the National Aeronautics and Space Administration (NASA). Until the development of commercial launch sites, Federal launch ranges (e.g., Vandenberg AFB in the Western Range and Cape Canaveral Air Station in the Eastern Range) provided commercial launch operators with facilities and launch support, including flight and range safety services. To enable and encourage the development and use of launch sites that are not operated or collocated with and supported by a Federal launch range, the FAA established regulations for launches and reentries occurring from non-Federal launch sites (see 14 CFR Parts 401, 417, and 420). These regulations also provided licensed launch site operators with licensing and safety requirements to protect the public from the risks associated with launch and reentry activities at licensed sites.

Although Federal launch ranges can provide services for many types of launch vehicles and missions, these ranges operate under detailed specifications and procedures that could significantly increase costs to commercial customers. Further, schedule flexibility could be severely limited because government launches would retain priority over commercial launches in any scheduling conflict.

Launch operators wishing to use non-Federal facilities must determine whether their proposed operations are best suited to a private launch facility with infrastructure constructed for their specific operations or whether they should pursue launch operations at a facility where some infrastructure already exists. One example of a facility where some infrastructure may already exist for certain types of vehicles is an airport. If launch operators choose this type of site, they must consider whether it is licensed to offer launch services and whether their operations would be compatible with the type and schedule of current FAA-licensed and other airport operations.

The Role of the USAF

The AFFTC is the host organization at Edwards AFB, which is located 48 kilometers (30 miles) east of the Mojave Airport. The AFFTC manages the special use airspace designated as Restricted Area R-2515 (contained within the R-2508 Complex), which would be the primary operating area for the vehicles launched from the Mojave Airport. The R-2508 Complex is comprised of MOAs, Restricted Areas, and Air Traffic Control Assigned Airspace (ATCAA). In addition, individual restricted areas, each with their own airspace manager lie within the R-2508 Complex. This collection of special use airspace is used by military aircraft for flight test and training activities, which are similar to the flight of the proposed launch vehicles. Commercial and private agencies that operate aircraft in the R-2508 Complex maintain appropriate Letters of Agreement (LOA) with both the R-2508 Complex Control Board and the AFFTC for operation in their respective areas. In addition, USAF aircraft use Mojave Airport for some missions. The AFFTC also operates the airfield, which would serve as the primary emergency landing site for the launches. These entities also have a responsibility for the environment and assets on the ground, which have the potential to be affected by launches. Therefore, the FAA requested and the USAF agreed to participate as a cooperating agency in the preparation of NEPA analysis for this proposed action.

The Role of the R-2508 Joint Policy and Planning Board (JPPB) and the R-2508 Complex Control Board

Management of the R-2508 Complex falls under the R-2508 JPPB. The JPPB was founded in 1975 under direction of the Joint Logistics Commanders and approved by the respective Service Chiefs and the Office of Secretary of Defense. JPPB members are the Commanders of the Naval Air Warfare Center, Weapons Division, China Lake; the AFFTC, Edwards AFB; and the National Training Center, Fort Irwin. The R-2508 Complex Control Board is the executing agent for the JPPB and is responsible for supervisory management of the R-2508 Complex. It is comprised of individuals representing their respective JPPB Commander. The JPPB and the Complex Control Board exercise responsibility for joint use airspace of the R-2508 Complex. Individual organizations are responsible for certain individual Restricted Areas that are contained within the R-2508 Complex.

The Role of the EKAD

The EKAD was formed in February 1972 for the purpose of acquiring and operating the Mojave Airport. In addition to being the project proponent, the EKAD is also the lead agency for the CEQA process. The FAA will work closely with the EKAD to minimize duplication between the NEPA and CEQA analyses for this action.

1.1 Background

Under this proposed action, the FAA would issue a launch site operator license to the EKAD for the Mojave Airport. The FAA may also issue a launch license to individual

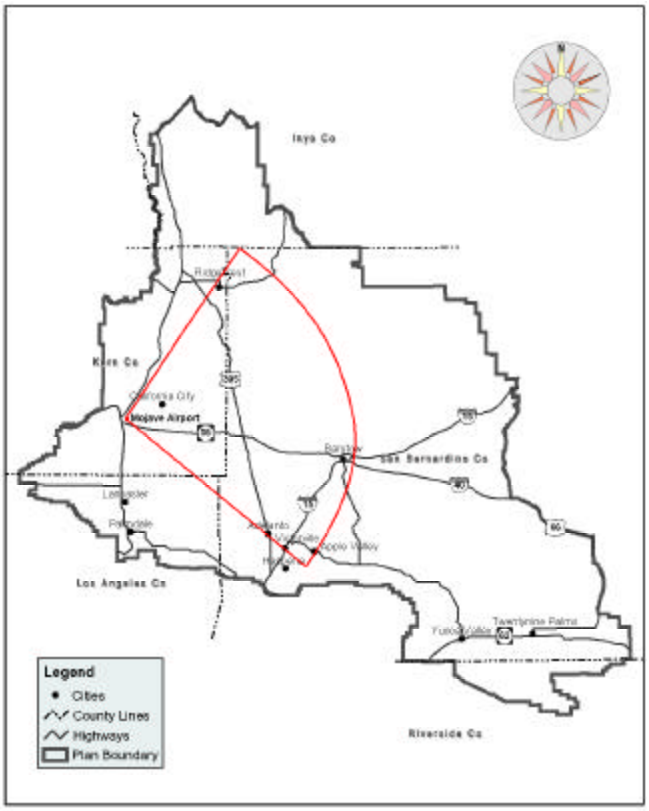
operators for launches from the Mojave Airport. The launch site operator license would be for the purpose of operating a facility to launch, horizontally launched, suborbital rockets.[1] In addition, the EKAD may offer other services for commercial launch companies at the Mojave Airport including static engine firings, launch vehicle manufacturing, and other testing and manufacturing activities. These services and other testing and manufacturing activities are unrelated to, and are not authorized by the Launch Site Operator License. The function of the launch facility would be to provide a location to launch manned suborbital rockets and other payloads[2] into suborbital trajectories. The issuance of a launch site operator license to EKAD does not permit EKAD to conduct launches, only to offer the facility and infrastructure to launch operators. Individual launch operators proposing to conduct launches from the Mojave Airport would need to obtain licenses from the FAA.

The FAA will examine the safety and policy implications, as well as environmental impacts associated with the launch activities in implementing its licensing program. The EA only analyzes potential environmental impacts from the project. Safety and policy implications are analyzed in documents other than this EA. The FAA licenses launches and issues licenses for the operation of launch sites based on the evaluation of the safety of the proposed activities and their associated environmental impacts. The Region of Influence (ROI) for this proposed action is outlined in Figure 1-1.

[1] The FAA has proposed the following definition for suborbital rocket which is being considered for adoption but has not yet been approved: "a rocket propelled vehicle intended for flight on a suborbital trajectory whose thrust is greater than its lift for the majority of the powered portion of its flight." The following definition has been proposed but not approved for suborbital trajectory: "the intentional flight path of a launch vehicle, reentry vehicle, or any portion thereof whose vacuum instantaneous impact point does not leave the surface of the earth." As defined in Corrected Copy of October 20, 2003 Notice, 68 Federal Register 59977, incorporating changes in a Correction Notice issued October 27, 2003, 68 Federal Register 61241, and correcting misprints available at http://ast.faa.gov.

[2] For purposes of this document, the payload is the item that an aircraft or rocket carries over and above what is necessary for the operation of the vehicle in flight.

Figure 1-1. Region of Influence



Source: Draft EIR/EIS for the West Mojave Plan, 2003

Upon issuance of the required FAA license, the EKAD would open the Mojave Airport to commercial launch operations. The first suborbital launch could occur in 2004. Proposed launch operations currently include launches of two types of launch vehicles. The first type referred to in this document as **Concept A** includes air-drop designs where two vehicles, an airplane and launch vehicle are mated together and the airplane carries the launch vehicle to a predetermined altitude where the launch vehicle is dropped and its rocket engines ignite. The second type referred to in this document as **Concept B** includes horizontally launched vehicles, which use rocket power to takeoff from a standard aviation runway.

Launch providers would be responsible for obtaining launch licenses from the FAA to conduct launches at the Mojave Airport. The FAA may use the analysis in this document as the basis for an environmental determination of the impacts of these launches to support licensing decisions for the launch of specific launch vehicles from the Mojave Airport. In addition, launch providers would be responsible for establishing LOAs with the airspace managers of each special use airspace in which the vehicles would operate. Launch license operators would be required to document establishment of LOAs in order to obtain a launch license from the FAA.

The FAA's Licensing and Safety Requirements for Operation of a Launch Site states that to gain approval for a launch site location, an applicant shall demonstrate that for each launch point proposed for the launch site, at least one type of expendable or reusable

launch vehicle can be flown from the launch point safely (14 CFR Part 420.19(a)). If an applicant proposes to have more than one type of launch vehicle flown from a launch point, the applicant shall demonstrate that each type of expendable or reusable launch vehicle planned to be flown from the launch point can be flown from the launch point safely (14 CFR 420.19(b)). It is therefore necessary for the EKAD to demonstrate that both Concept A and Concept B launch vehicles can be launched safely from the Mojave Airport.

1.2 Purpose and Need

The Mojave Airport would serve as an alternative location to Federal facilities or other commercial sites for horizontally launched, suborbital vehicles. The Mojave Airport already provides a location to test aircraft and this would allow the EKAD to offer the Mojave Airport to existing customers wishing to conduct launch operations. Customers may use the facility to compete for prizes such as the X-Prize or to provide for-profit launch services. The X-Prize is described on the organization's web site as "a $10,000,000 prize to jumpstart the space tourism industry through competition between the most talented entrepreneurs and rocket experts in the world." (X-Prize, 2003) The $10 million cash prize will be awarded to the first team that

- Privately finances, builds, launches a launch vehicle, able to carry three people to 100 kilometers (62.5 miles);
- Returns safely to Earth; and
- Repeats the launch with the same launch vehicle within two weeks. (X-Prize, 2003)

For-profit launch services may include tourism activities, selling merchandise flown in the vehicle, or other activities. These activities are consistent with the objectives of the CSLA. Given the infrastructure and development costs associated with constructing launch facilities, the Federal government has been the owner/operator or has leased/sold unused or excess infrastructure and provided expertise to commercial launch operators for the majority of commercial launches. However, with the increasing demand for access to space, commercial launch site operators have begun to develop proposals to offer launch sites not collocated with Federal facilities or operated by the DoD and NASA to meet the demand for lower cost access to space.

For a launch site to meet the needs of launch operators, it must have adequate infrastructure and available airspace. Required infrastructure in this case includes a runway of sufficient length to accommodate horizontal launch vehicles, adequate ramp and hangar space, a control tower, and airspace compatible with the proposed flight requirements.

1.3 Public Involvement

The CEQ implementing regulations for NEPA describe the public involvement requirements for agencies (40 CFR 1506.6). Public participation in the NEPA process not only provides for and encourages open communication between the FAA and the public, but also promotes better decision-making.

The Draft EA/Initial Study was released for public comment on October 31, 2003. A Notice of Availability appeared in the Federal Register on November 6, 2003, which initiated the comment period under NEPA. The California Clearinghouse acknowledged receipt of the Draft EA/Initial Study on November 12, 2003, which initiated the 30-day comment period for the document under CEQA. A notice of availability of the proposal to adopt a Negative Declaration was released on November 5, 2003. The comment period for CEQA closed on December 11, 2003, and the FAA requested that all comments on the Draft EA/Initial Study be received no later than December 12, 2003.

A public hearing was held on December 10, 2003 in Mojave, CA. The public hearing was held to solicit and record comments on the Draft EA/Initial Study. The public hearing consisted of a presentation by the FAA, a public comment session, and an informal poster session with two poster stations and representatives on hand to answer questions. The 20-minute FAA presentation outlined the NEPA/CEQA process, the proposed activities, and potential impacts to resource areas that may have been of particular concern to members of the community. After the presentation, the public comment session allowed the public to provide comments on the Draft EA/Initial Study. Six attendees provided oral comments; two commenters spoke on behalf of EKAD; one spoke on behalf of the Mojave Town Council; the remaining three were from the public. Four written comments were also provided by the public. The transcript of the proceedings is in Appendix A. In addition to the public hearing, the public was provided the opportunity to comment through toll-free fax and phone numbers, mail, and e-mail. Responses to comments are provided in Appendix B.

1.4 Related Environmental Documentation

The DOT, DoD and NASA have previously analyzed the environmental effects of launches and launch site operations. Other planning and site-specific documents that were used as references in the preparation of this EA are cited in Section 8 of this document as appropriate. The following NEPA and CEQA documents were used by the FAA in the preparation of this EA and are incorporated by reference.

- Department of Interior. *Draft Environmental Impact Statement/Environmental Impact Report for the West Mojave Plan, A Habitat Conservation Plan and California Desert Conservation Area Plan Amendment*, May 2003.

- DoD. *Final Environmental Assessment for the Orbital Reentry Corridor for Generic Unmanned Lifting Entry Vehicle Landing at Edwards Air Force Base*, December 2002.

- DoD. *Edwards Air Force Base Digital Airport Surveillance Radar Environmental Assessment*, June 2002.

- DOT. *Final Environmental Assessment for the Site, Launch, Reentry, and Recovery Operations at the Kistler Launch Facility, Nevada Test Site,* April 2002.

- DOT. *Final Programmatic Environmental Impact Statement for Licensing Launches (PEIS LL)*, May 24, 2001.

- DOT. *Final Programmatic Environmental Impact Statement for Commercial Reentry Vehicles (PEIS CRV)*, May 1992.

- NASA. X-33 Advanced Technology Demonstrator Vehicle Program, Final Environmental Impact Statement, September 1997.

- Kern County. *Mojave Specific Plan, Draft Environment Impact Report*, June 2003.

In accordance with the CEQ regulations for NEPA documents, this EA tiers from the PEIS LL and the PEIS CRV.

2. Description of Proposed Action and Alternatives

2.1 Proposed Action/Preferred Alternative

The proposed action is for the FAA to issue a launch site operator license to the EKAD for the Mojave Airport. The FAA may also issue a launch license to individual operators for launches from the Mojave Airport. 14 CFR Chapter III, part 420 contains the requirements for obtaining and possessing a license to operate a launch site. Under the regulations, an applicant is required to provide the FAA with information sufficient to conduct environmental and policy reviews and determinations. The EKAD intends to operate a launch site at the Mojave Airport for commercial use by providing customers a site from which to launch suborbital missions using horizontally launched vehicles, and therefore must obtain a launch site operator license from the FAA.

The operator of the launch site and the launch operator would need to provide information to support the FAA's environmental determinations under NEPA. This document would provide the information and analysis required to fulfill the NEPA requirements for licensing a launch site operator and licensing the launch of some launch vehicles. Since this project must also meet the requirements of CEQA, the EKAD also must provide sufficient information about the proposed operations at the Mojave Airport to support a determination under CEQA.

The successful completion of the environmental review process does not guarantee that the FAA would issue a launch site operator license to the EKAD for the Mojave Airport or a launch license to an individual launch operator. The project must also meet all FAA safety, risk, and indemnification requirements. A license to operate a launch site does not guarantee that a launch license would be granted for any particular launch proposed for the site. All individual launch license applications would be subject to separate FAA review and licensing.

The EKAD has identified two types of launch vehicles, identified in this analysis as **Concept A** and **Concept B**, which would be typical of the vehicles that would operate from the Mojave Airport. The proposed action/preferred alternative would include launches of both Concept A and Concept B launch vehicles. The potential users of the launch site would be responsible for obtaining any necessary permits or approvals including a launch license for specific missions from the FAA. This document may be used as the basis for the FAA to make a determination about licensing the launches of some types of launch vehicles from the Mojave Airport. The FAA may use this document as the basis for an environmental finding that would serve as part of the requirements of the FAA launch licensing process for proposed launch operators at the Mojave Airport. Additional environmental analysis would need to be conducted for any activity that is not addressed in this EA or in previous environmental analyses.

This EA addresses the overall impacts to the environment of the proposed operations anticipated for the five-year period encompassing the FAA's launch site operator license including

- Launching and landing Concept A and B launch vehicles at the Mojave Airport, and
- Testing rocket engines that would be incorporated into Concept A and B launch vehicles.

The activities included in this analysis are the launch of suborbital rockets as described in Concept A and Concept B, and the testing of rocket engines. The FAA does not license the vehicle itself or the ground tests of rocket engines, only the launch of the vehicle and the operation of the launch site. The environmental impacts of the engine tests are included in this document because they are a related activity. This document may be used as the basis for making a determination about the environmental impacts of launches of individual Concept A or B launch vehicles from the Mojave Airport.

No construction activities are proposed as part of this action. Existing infrastructure including hangars and runways would be used to support launch and landing operations at the launch site. Existing rocket engine test stands may also be used for static tests of rocket engines. The engines that are tested would either be incorporated into vehicles that are launched at the Mojave Airport or they could be incorporated into vehicles that are launched at other facilities.

The scope of this analysis considers the use of the Mojave Airport and nearby special use airspace for launch and flight of horizontally launched Concept A and Concept B vehicles into suborbital trajectories. It also considers their landing and static tests of engines.

2.1.1 Mojave Airport

The Mojave Airport is located in the southeastern corner of Kern County, on the east side of the unincorporated town of Mojave, CA. The airport is owned and operated by the EKAD, which is a special district with an elected Board of Directors and a General Manager. The Mojave Airport was formerly a military base and is currently the largest general aviation airport in Kern County. The airport serves as a Civilian Flight Test Center, the location of the National Test Pilot School (NTPS), and as a base for modifications of major military jets and civilian aircraft. The NTPS operates various aircraft types including high performance jet aircraft, single-and twin-engine propeller aircraft and helicopters. Numerous large air carrier jet aircraft are currently being stored and maintained at the Mojave Airport. Many of these aircraft are older technology designs, and most likely will not be flown again. However, some of the newer aircraft stored at the Mojave Airport, such as MD80, F100, B737-300+ and hush-kitted 727s, are still part of the active commercial airline/air cargo fleet and are maintained for immediate use.

The Mojave Airport also includes aircraft storage and reconditioning facility and is home to several industrial operations, such as BAE Systems, Fiberset, Scaled Composites, AVTEL, XCOR, Orbital Sciences, and General Electric. No airport modifications are currently planned to accommodate the proposed launch of vehicles at the Mojave Airport.

2.1.1.1 Ground Facilities

The Mojave Airport comprises an area of approximately 1,214 hectares (3,000 acres) and makes up 9.6 percent of the total area of the town of Mojave. There is open land to the north and east, and industrial/commercial uses on the south side of the airport. The Mojave Airport with its associated airport facilities is the primary employer of the town of Mojave. Major facilities include the terminal and industrial area located in the southern portion of the airfield, hangars, offices, maintenance shop, and fuel services facilities. Rocket engine test stands are located in the northern portion of the airport. Aircraft parking capacity includes 600 tie downs and 60 T-hangars. The airport layout plan is shown in Figure 2-1.

The current administrative building covers an area of approximately 557 square meters (6,000 square feet). There is a fenced-in area at the base of the control tower from which spectators can view launch activities. The spectators would be secured in this area and monitored by security guards during launch activities.

The Mojave Airport consists of three runways with associated taxiways and other support facilities, Runway 12-30, Runway 8-26, and Runway 4-22. Runway 12-30 is 2,896 meters (9,502 feet) long and is the primary runway for large air carrier jet and high performance civilian and military jet aircraft. Runway 8-26 is 2,149 meters (7,050 feet) long and is primarily used by general aviation jet and propeller aircraft. Runway 4-22 is 1,202 meters (3,943 feet) long and is used by smaller general aviation propeller aircraft and helicopters. The runway approaches cover different land use types and are described as

- Runway 12 (northwest) – open land,[3]
- Runway 30 (southeast) – open land,
- Runway 8 (west) – some mixed residential[4] and commercial development,[5]
- Runway 26 (east) – open land,
- Runway 4 (southwest) – residential and commercial uses; high school,[6] and
- Runway 22 (northeast) – open land.

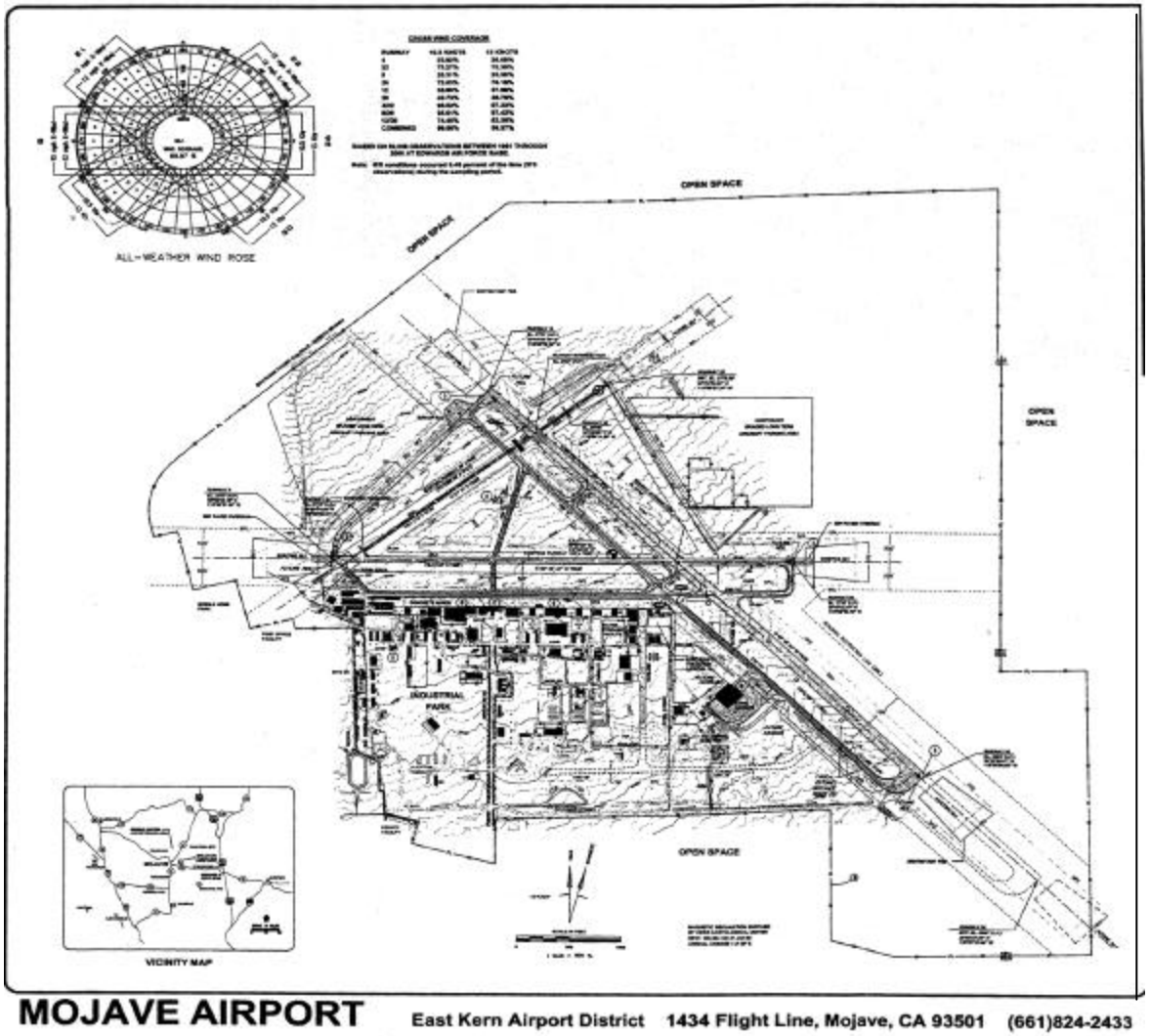
[3] Open land - Free of structures and other major obstacles such as walls, large trees, poles, or overhead wires with minimum dimensions of at least 23 meters by 91 meters (75 feet by 300 feet). (Kern County, 2003c)

[4] Residential Uses - Areas comprised of single-family homes, mobile homes, multi-family units, apartments, or condominiums. (Kern County, 2003c)

[5] Commercial Uses - Areas comprised of offices, retail trade, service commercial, wholesale trade, warehousing, general manufacturing, utilities, or extractive industry. (Kern County, 2003c)

[6] High school - Areas in which the majority of occupants are children, elderly, and/or handicapped are of particular concern because occupants have reduced effective mobility or are unable to respond in emergency situations. (Kern County, 2003c)

Figure 2-1. Mojave Airport Layout Plan



2.1.1.2 Decommissioning Activities

No airport modifications are currently planned to accommodate the proposed launch of vehicles at the Mojave Airport. If launch activities ceased at the Mojave Airport, it would continue existing operations as a general aviation airport.

2.1.2 Operations in Special Use Airspace

Operations of the proposed vehicles within the R-2508 Complex would be compatible with the high speed, highly maneuverable flights being conducted in this airspace and would be conducted under LOAs with the individual vehicle operators and the managers of each special use airspace involved. After takeoff from the Mojave Airport, vehicles would enter the R-2508 Complex and R-2515 Restricted Airspace under control of either High Desert TRACON or Space Positioning Optical Radar Tracking (SPORT) Radar Control Facility located at Edwards AFB. All flights would be conducted under control of one of these agencies to insure appropriate integration with other aircraft operations in the special use airspace.

2.1.3 Concept A

2.1.3.1 Description of Launch Vehicle

Launch vehicles included in Concept A consist of two components, a carrier aircraft and a mated suborbital launch vehicle. The aircraft would have turbojet engines using Jet A-1 fuel. Total thrust of the engines would be less than 35,600 Newtons (8,000 pounds). The carrier aircraft would carry the launch vehicle to the designated launch release altitude. The launch vehicle would use a hybrid rocket engine with nitrous oxide (N_2O) and hydroxyl-terminated polybutadiene (HTPB) as propellants. The launch vehicle would use only suborbital trajectories and, therefore, would not reach Earth orbit. Concept A launch vehicles would launch and land horizontally and would not require runway lengths in excess of existing infrastructure at the Mojave Airport.

The carrier aircraft and launch vehicle would both be piloted. The wingspan of the representative carrier aircraft would be approximately 25 meters (82 feet) and its length would be approximately nine meters (30 feet). The wingspan of the representative launch vehicle would be approximately five meters (17 feet) and its length would be approximately six meters (20 feet). The weight of the launch vehicle when fully fueled would be approximately 3,175 kilograms (7,000 pounds).

The pilot in command (PIC) would have cockpit displays monitoring the status of the vehicle. Communication between the PIC and ground crew would be accomplished by standard aircraft-band Very High Frequency radio. The PIC would also be equipped with a “hot mike” (live microphone) audio on the video telemetry downlink for communications between the PIC and the ground crew. A mobile ground station within the Airport property would be set up during flight tests for data monitoring and recording flight parameters. The vehicle’s avionic displays would be duplicated on a Mission Control monitor.

The PIC would be responsible for flight safety decisions. Mission control would provide data and recommendations and would direct abort if parameters exceed normal mission operating limits. The PIC would also be responsible for shutting down the rocket motor burn system if parameters exceed normal mission limits. The vehicle propulsion system would also contain an internal automatic-shutdown mode should system critical operating parameters be exceeded.

A small oxygen bottle would be carried in the cabin of the carrier aircraft and launch vehicle to maintain oxygen levels for the pilots. Carbon dioxide (CO_2) would be scrubbed by an absorber system. Humidity in the cabin would be controlled by passing air through the absorber system to remove water vapor.

2.1.3.2 Description of Flight Profile

The carrier aircraft and launch vehicle would takeoff horizontally from a conventional runway at the Mojave Airport. The aircraft would ascend to an altitude from 16 to 20 kilometers (10 to 12 miles) and the launch vehicle would be released from the carrier aircraft. Rocket engines on the launch vehicle would be fired as the aircraft pulls away. The carrier aircraft would make a powered horizontal landing on the designated runway after releasing the launch vehicle. The launch vehicle would climb until propellants are consumed. The vehicle would glide unpowered along a parabolic trajectory until reaching apogee (the highest point in the vehicles flight trajectory). The launch vehicle would then descend and glide unpowered, to a horizontal landing on a conventional runway at the Mojave Airport.

2.1.3.3 Description of Pre-Launch, Launch, and Landing Activities

Pre-Launch. Launch operators would be required to notify Mojave Airport and the air traffic control tower 24 hours in advance of a planned launch. The air traffic control tower would notify the launch operator of other activities on the airport, resolve conflicts for use, and notify other authorities such as Edwards AFB and appropriate airspace scheduling agencies. In addition, each operator would be required to comply with scheduling procedures for the individual special use airspace to be used. Mission rehearsals would be conducted with all flight and ground support crew prior to each launch, and would be repeated with various failure scenarios, and irregular performance to ensure crew readiness.

Launch. The launch vehicle would be mated to the carrier aircraft. The aircraft, carrying the launch vehicle, would takeoff horizontally. The launch vehicle would be released from an altitude between 16 to 20 kilometers (10 to 12 miles) and the rocket engine on the launch vehicle would be ignited. The launch vehicle would use a flight path angle of approximately 85 degrees until propellant is spent (after approximately 65 seconds of climbing). The vehicle would continue to coast to apogee. Apogee for Concept A vehicles would likely occur at approximately 100 kilometers (62.5 miles) altitude. After reaching apogee, the vehicle would descend with various equipment items deployed that

are designed to stabilize and decelerate the vehicle in a controlled manner during its descent.

Landing. The PIC of the carrier vehicle would request authorization from the air traffic control tower to land at the Mojave Airport after releasing the launch vehicle. The carrier aircraft would make a powered horizontal landing on the designated runway. The PIC of the launch vehicle would request authorization from the air traffic control tower to land at the Mojave Airport. The vehicle would make an unpowered horizontal landing on the designated runway. In the unlikely event of an emergency landing, the PIC would attempt to reach the primary abort site at the main runway at Edwards AFB. However, any airport within gliding range with a runway of at least 1,219 meters (4,000 feet) would be a candidate for an emergency landing location. The emergency landing/abort areas are shown in Figure 2-2.

2.1.3.4 Description of Proposed Payloads

There are no payloads currently planned for Concept A vehicles.

2.1.3.5 Launch Manifest

Table 2-1 shows the number of launches proposed per year for Concept A launch vehicles at the Mojave Airport.[7]

Table 2-1. Maximum Number of Launches of Concept A Launch Vehicles Per Year

Year	2003	2004	2005	2006	2007	2008
Maximum Number of Launches	3	6	6	6	6	6

Therefore, the total maximum number of launches of Concept A launch vehicles would be 33 over the five-year period.

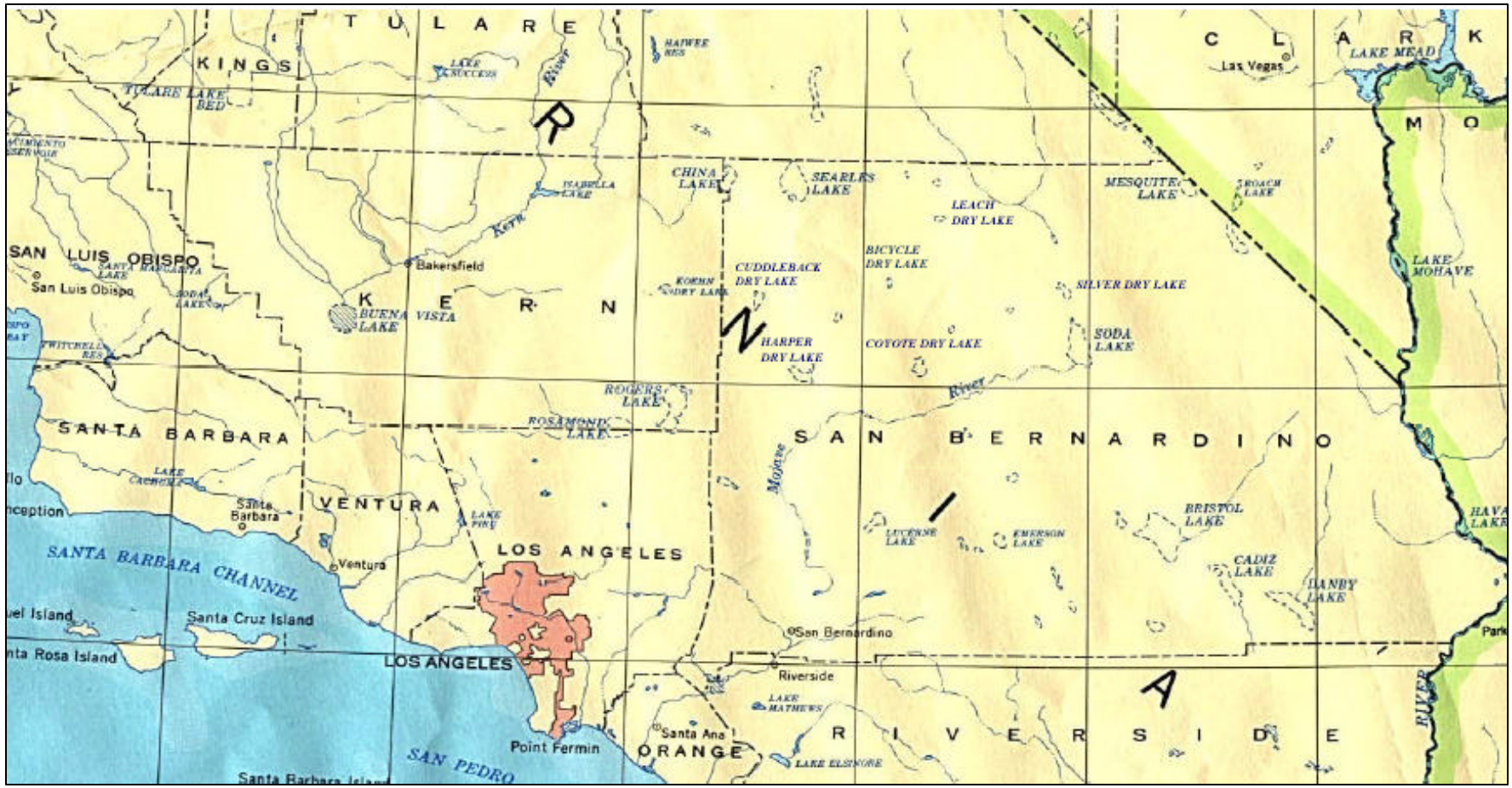
2.1.4 Concept B

2.1.4.1 Description of Launch Vehicles

Launch vehicles included in Concept B would be a single component. The rocket motors would be turned on while the launch vehicle is on the runway at the Mojave Airport.

[7] The number of launches of Concept A vehicles analyzed in this document represents the number of launches that Concept A companies plan to conduct each year. The actual number of launches that the FAA may authorize from the proposed site would have impacts equal to or less than those analyzed in this document.

Figure 2-2. Locations of Dry Lakes



The rocket motors would use liquid oxygen (LO_x) and either kerosene or alcohol. Concept B launch vehicles would use suborbital trajectories and, therefore, would not reach Earth orbit. Concept B launch vehicles would launch and land horizontally at the Mojave Airport. They would not require runway lengths in excess of existing infrastructure at the Mojave Airport.

The wingspan of a representative vehicle would be approximately 6.7 to 9.0 meters (22 to 30 feet) and the length of the vehicle would be approximately 5.8 to 12.2 meters (19 to 40 feet). The weight of the vehicle when fully fueled and ready for takeoff would be between 1,150 and 7,500 kilograms (2,600 and 16,500 pounds).

Concept B launch vehicles would be piloted and the PIC would have cockpit displays capable of monitoring the status of the vehicle. Communication would be possible between the PIC and ground crew. Very High Frequency radio would be used for communications. Ground and air traffic control frequencies would be used to communicate with Mojave Airport. In some instances it may be necessary to use a dedicated frequency for in-company communications. In all instances, safety information would be relayed to all relevant participants. The PIC would be familiar with high performance aircraft, aerobatic flight, glide flight and unpowered landing.

The PIC would be responsible for activating the Flight Safety System (FSS). This may consist of a number of steps, which would be undertaken by the PIC to ensure that the vehicle glides to a safe landing at the primary landing location at the Mojave Airport or at a designated emergency landing location. The steps that a PIC might take to activate the FSS would include turning off the engine run switch or closing the propellant pre-valves, in both instances stopping the flow of propellant to the engine and thereby stopping the engine. It may also be possible for the PIC to undertake steps to vent pressure in the LO_x tank or dump the LO_x, which would also cause the engines to stop working. This process, however, may take up to a minute to complete and, therefore, would be used only if the other methods failed to cut the engine off.

The vehicle would carry a fault-tolerant life support system to ensure that the pilot has adequate oxygen during the mission.

2.1.4.2 Description of Flight Profile

Concept B vehicles would launch horizontally from a runway at Mojave Airport and would likely fly east along a steep ascent trajectory until the propellants are expended. These vehicles would coast unpowered along a parabolic trajectory until reaching apogee. They would then coast down until pullout and glide to an energy-management area between 10 and 160 kilometers (six and 100 miles) downrange of the Mojave Airport where it may be necessary to conduct a series of maneuvers to expend excess energy before making a descent to the Mojave Airport. Upon reaching the Mojave Airport it may be necessary to conduct additional maneuvers to expend excess energy before performing an unpowered horizontal landing.

2.1.4.3 Description of Pre-Launch, Launch, and Landing Activities

Pre-Launch. The Mojave Airport has established procedures for customers to provide notification for upcoming launches. Each launch operator would be required to notify Mojave Airport and the air traffic control tower 24 hours in advance of a planned launch. The air traffic control tower would notify the launch operator of other activities on the launch site, resolve conflicts for use, and notify other authorities such as Edwards AFB and appropriate airspace scheduling agencies. In addition, each operator would be required to comply with scheduling procedures for the individual special use airspace to be used.

Pre-launch activities would include a mission readiness review in which a series of tests would be conducted on vehicle systems, engine systems, and mission procedures. These tests would be conducted until the vehicle consistently passes all mission requirements. The vehicle would then be fueled and would undergo a pre-launch check.

The pre-launch check would be conducted in a fashion similar to conventional aircraft. An engineer would check all safety critical and high-risk systems with the PIC, checking off each system or component as ready for takeoff. The PIC, mission conductor, and crew chief each have the duty and authority to abort or delay the launch at any time, if he/she feels that an unsafe or hazardous launch condition exists.

Prior to launch, a brief test of the engines and ignition system may be conducted. This would involve firing each engine for a short duration to verify proper ignition and shutoff. After completing the pre-launch and engine check the launch vehicle would be moved to the launch location, by towing or pushing the vehicle to the appropriate location. Communication with the air traffic control tower would be confirmed and the PIC would confirm the previous authorization for the launch and landing.

Launch. The rocket engines would be turned on and the vehicle would takeoff horizontally, using a flight path angle of approximately 20 to 50 degrees and fly east or, for some missions, north-northeast. The vehicle would use a steep ascent trajectory until its fuel supply is exhausted. Once the engines are turned off or propellant is exhausted, the vehicle would fly on a parabolic trajectory for four to 240 seconds, and coast to apogee. Apogee for Concept B vehicles would likely occur at altitudes between four and 175 kilometers (13,000 and 575,000 feet) above mean sea level. After reaching apogee, the vehicle would glide to a pullout and energy management area, between 10 and 160 kilometers (six and 100 miles) downrange of the Mojave Airport to expend excess energy before landing. It may be necessary to fly several circular patterns to expend excess energy before gliding back to Mojave Airport. At Mojave Airport, the vehicle may fly several additional circular patterns to expend excess energy.

Landing. The PIC would notify the air traffic control tower prior to landing at the Mojave Airport. The vehicle would make an unpowered horizontal landing on the designated runway. In the unlikely event of an emergency landing, the PIC would attempt to reach one of the following designated abort sites: Edwards AFB/Rogers Dry

Lake, Boron Airstrip, or for the highest performance vehicles, Baker Airstrip or China Lake Naval Air Weapons Station (NAWS)/China Dry Lake. If the PIC cannot reach any of the designated abort sites, he/she would make every effort to land on one of the numerous regional dry lakes or in the areas northeast of North Edwards, Boron and California City. The dry lakes in the area that could be used include Rogers, Koehn, Harper, Cuddeback, Coyote, Soda, Bicycle, Silver, Leach, Searles, and China. See Figure 2-2 for a map of these dry lake locations.

2.1.4.4 Description of Proposed Payloads

Payloads may include: passengers, inert collectible items, and microgravity experiments. The weight of these payloads would not exceed 200 kilograms (440 pounds), and they would not be larger than 2.2 meters tall by 1.2-meter diameter (7.2 feet tall by 4.0 feet diameter). The payloads would not carry stored energy or toxic, hazardous, or radioactive material. The payload would remain inside the vehicle at all times during the mission.

2.1.4.5 Launch Manifest

Table 2-2 shows the number of launches proposed per year for Concept B launch vehicles at the Mojave Airport.[8]

Table 2-2. Maximum Number of Launches of Concept B Launch Vehicles Per Year

Year	2003	2004	2005	2006	2007	2008
Maximum Number of Launches	0	0	10	25	30	50

Therefore, the total maximum number of launches of Concept B launch vehicles would be 115 over the five-year period.

2.2 Alternatives to the Proposed Action

The FAA will consider two alternatives to the proposed action in this EA. The first alternative would be to issue a launch site operator license to the EKAD for the Mojave Airport for inclusion of launch vehicles specifically fitting the description of Concept A. The second alternative would be to issue a launch site operator license to the EKAD for the Mojave Airport for inclusion of launch vehicles specifically fitting the description of Concept B.

[8] The number of launches of Concept B vehicles analyzed in this document represents the number of launches that Concept B companies plan to conduct each year. The actual number of launches that the FAA may authorize from the proposed site would have impacts equal to or less than those analyzed in this document.

2.2.1 Alternative 1 - Concept A Only

This alternative would involve the issuance of a launch site operator license to the EKAD for Mojave Airport that would allow only Concept A vehicles to be launched from the Mojave Airport.

2.2.2 Alternative 2 - Concept B Only

This alternative would involve the issuance of a launch site operator license to the EKAD for Mojave Airport that would allow only Concept B vehicles to be launched from the Mojave Airport.

2.3 No Action Alternative

Under the no action alternative, the FAA would not issue a launch site operator license and there would be no commercial launches from the Mojave Airport. The EKAD would not be able operate a commercial launch facility at the Mojave Airport. The Mojave Airport facility would continue to be available for existing aviation related activities.

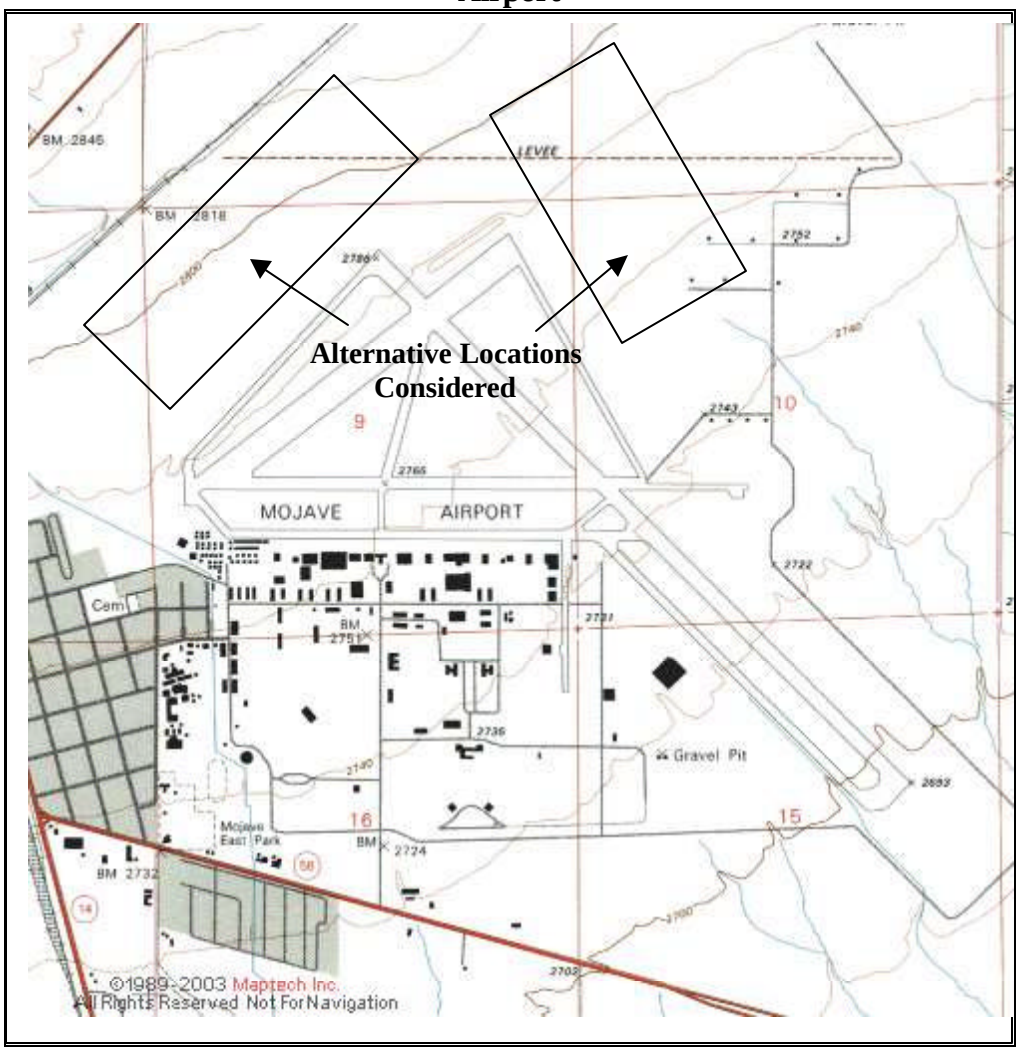
2.4 Alternatives Considered But Not Carried Forward

The alternatives discussed below were considered and eliminated from further consideration and analysis.

2.4.1 Alternative Locations/Configurations within Mojave Airport

Alternative locations within the Mojave Airport were considered for the launch site in the northern or eastern portion of the airport. The alternative locations considered at Mojave Airport are shown in Figure 2-3. These alternative locations within Mojave Airport would require that additional changes be made to the existing infrastructure. This could include the construction or renovation of hangars and the construction of new runways. This type of construction or renovation would be cost prohibitive and would cause significant delays in the proposed launch schedules and, therefore, this alternative was eliminated from further consideration.

Figure 2-3. Approximate Locations of Alternative Locations Considered at Mojave Airport



2.4.2 Alternative Launch Vehicles

Launches of alternative launch vehicles including vertical launch vehicles and orbital launch vehicles were considered for use at the Mojave Airport. Launches of these launch vehicles would require additional infrastructure at the Mojave Airport. This could include the construction of a vertical launch pad or extensions to the existing runways. This type of construction or renovation would be cost prohibitive and would cause significant delays in the proposed launch schedules and, therefore, this alternative was eliminated from further consideration.

2.4.3 Alternative Missions Including Reentries

Alternative missions including reentries were considered for the Mojave Airport. The proposed launch site operator has not applied for a launch and reentry site operator license and therefore, reentries of launch vehicles launched into Earth orbit from the

Mojave Airport are not considered to be reasonably foreseeable activities within the next five years. The impacts of these activities will not be considered in this EA.

3. Affected Environment

3.1 Overview of the Proposed Operational Area

This section gives an overview of the proposed operational area. This area is referred to as the ROI and is divided into on-site and off-site areas.

On Site

The Mojave Airport is located approximately 161 kilometers (100 miles) north of Los Angeles, CA on the western edge of the Mojave Desert (latitude/longitude is 35.059/-118.152). (Mojave Airport, 2003a) The Mojave Airport lies within Kern County at an elevation of 838 meters (2,750 feet). The original Mojave Airport, constructed in 1935, was a general aviation facility, but was converted to a Marine Corps air base in 1942. In 1961, the airport was returned to Kern County control, and in 1972, the Mojave Airport District was formed. (Mojave Airport, 2003a) The Mojave Airport District became the EKAD in 1974, which continues to manage the airport today. (Kern County, 2003b) Figures 3-1 and 3-2 show the location and layout of the Mojave Airport.

The site covers an area of 13.2 square kilometers (5.1 square miles), and of Mojave Airport's available 1,214 hectares (3,000 acres), approximately 80 hectares (200 acres) are developed. (Mojave Airport, 2003a) The Mojave Airport includes three runways (Runway 12-30, Runway 8-26, and Runway 4-22), an air control tower, engineering facilities, aviation fuel services, and a high bay building. (Mojave Airport, 2003a) In addition, the Mojave Airport has approximately 140 businesses on site that are high-technology manufacturers and light industrial enterprises. (Mojave Airport, 2003a)

The Mojave Airport provides runways and ramp space for a wide variety of aircraft including general aviation prop and turboprop aircraft, commercial airline carrier jets, military jets, and experimental and test pilot aircraft. (Mojave Airport, 2003a) Runway 12-30 is 2,896 meters (9,502 feet) long and serves large airline carrier jet aircraft and high performance military and non-military jet aircraft. Runway 8-26 is 2,149 meters (7,050 feet) long and serves general aviation and propeller aircraft, but can accommodate larger aircraft depending on the wind conditions. Runway 4-22 is 1,202 meters (3,943 feet) long and serves smaller propeller aircraft and helicopters. (Mojave Airport, 2003a)

In 2001, over 18,300 aircraft operations[9] took place at Mojave Airport with an average of 50 operations per day. (Kern County, 2003c) Over 93 percent of all operations at Mojave Airport were general aviation flights, and over 90 percent of all operations took place during daylight hours (7 am to 7 pm). (Kern County, 2003c) More recent data estimates indicate that approximately 33,800 aircraft operations occur each year. (Mojave Airport, 2003) The airspace over the Mojave Airport is defined as Class D airspace. The Mojave Airport airspace is discussed in Section 3.3. (Kern County, 2003c)

[9] Airport operations are based on the Mojave Airport control tower count of takeoffs and landings.

Figure 3-1. Map of Mojave Airport in Relation to Los Angeles, California

Source: Yahoo Maps, 2003

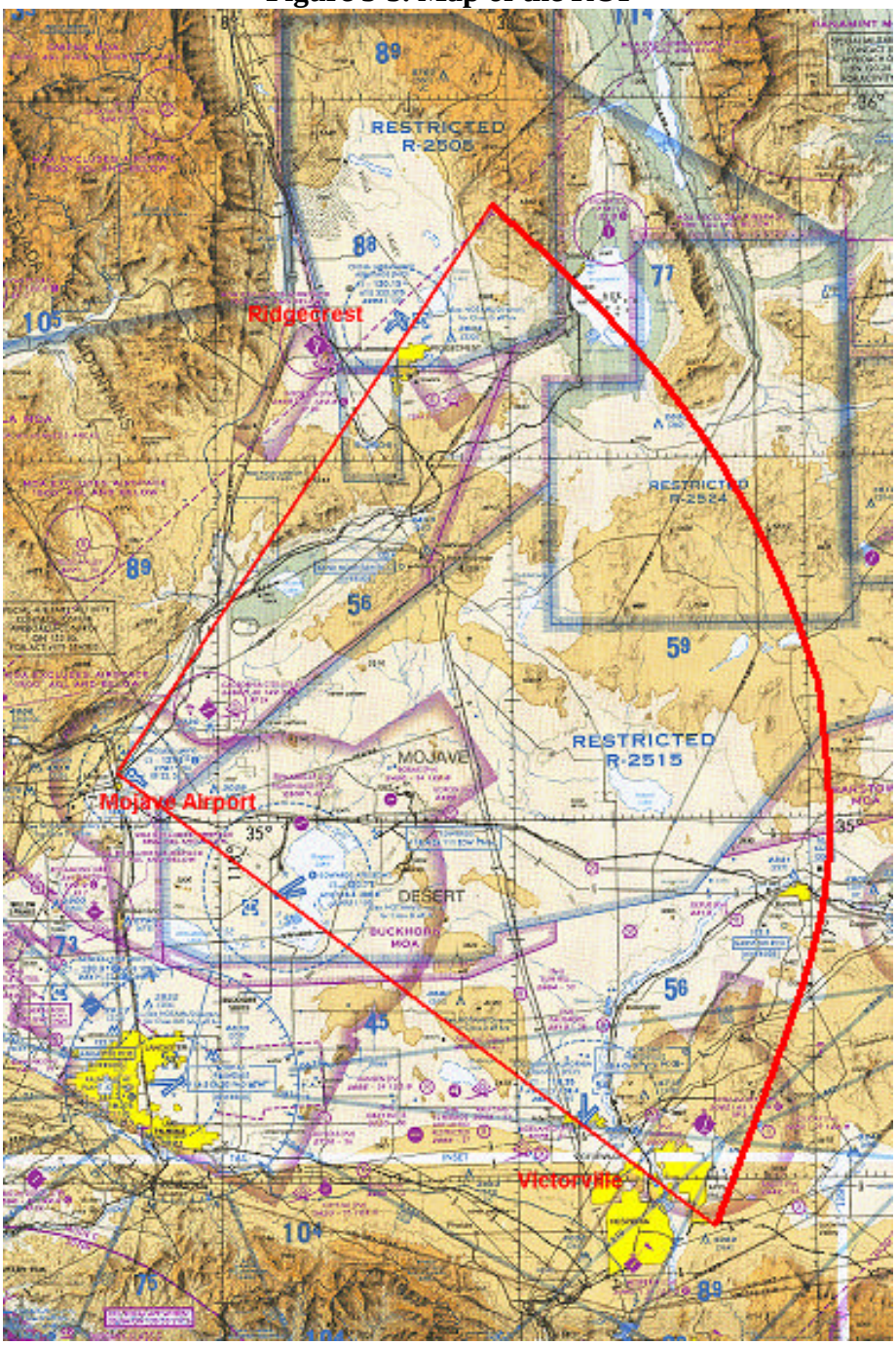
Figure 3-2. Layout of the Mojave Airport

Source: Mojave Airport, 2003a

Off Site

The ROI would cover over 9,886 square kilometers (3,800 square miles) and would include portions of Kern, Los Angeles, and San Bernardino Counties. Land uses in these areas include residential, commercial, industrial, public facilities, state and federal, resource management, and undeveloped lands. (Kern County, 2003b) This area is largely undeveloped desert with shrub and brush vegetation. (Kern County, 2003f) The Mojave community immediately outside of the Mojave Airport perimeter covers approximately 11,331 hectares (28,000 acres) and is mainly industrial, resource management, and undeveloped lands. (Kern County, 2003b) The ROI includes parts of Edwards AFB and the China Lake NAWS North and South Ranges. The ROI would be primarily contained within an airspace area created by the DoD and the FAA called the Joint Service Restricted R-2508 Complex, which restricts and controls non-military air traffic. (Kern County, 2003c) The R-2508 complex is made up of Special Use Airspace and ATCAA. The off-site ROI is shown in Figure 3-3.

Figure 3-3. Map of the ROI



Source: Maps.com, 2003

3.2 Air Quality

3.2.1 Definition of Resource

Air quality in a given location is usually measured in terms of the concentration of various air pollutants in the atmosphere. The concentration is measured against Federal and/or state ambient air quality standards that protect public health. Under the Federal

Clean Air Act (CAA), the U.S. Environmental Protection Agency (EPA) has established National Ambient Air Quality Standards (NAAQS) for criteria air pollutants: sulfur dioxide (SO_2), carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (including volatile organic compounds (VOCs) and nitrogen oxides (NO_x) as precursors), particulate matter with a diameter of less than 10 microns (PM_{10}), particulate matter of 2.5 microns or less in diameter ($PM_{2.5}$), and lead (Pb). For these pollutants, there are primary and secondary NAAQS. The primary standards were established to protect the public health with an adequate margin of safety, while the secondary standards were intended to protect the public from any known or anticipated adverse effects of a pollutant. These threshold levels were determined based on years of research on the health effects of various concentrations of pollutants on biological organisms.

The California Air Resources Board (CARB) has also developed state ambient air quality standards. The standards called California Ambient Air Quality Standards address the same pollutants as the Federal standards but at concentrations similar to or more stringent than the NAAQS. California also includes standards for some pollutants not in NAAQS such as visibility, sulfates, and hydrogen sulfide (HS). Table 3-1 provides the Federal and California air quality standards.

To further define local and regional air quality, the EPA divided the country into areas that achieve the NAAQS, called attainment areas, and those that do not achieve the NAAQS, called non-attainment areas. The non-attainment and attainment classifications are generally based on air quality monitoring data collected at certain sites in the state. The criteria for non-attainment designation vary by pollutant. An area is in non-attainment for ozone if its NAAQS has been exceeded more than three discontinuous times in three years at a single monitoring station and an area is in non-attainment for any other pollutant if its NAAQS has been exceeded more than once per year. Some areas are unclassified because insufficient data are available to characterize the area, while other areas are deemed maintenance areas.

Table 3-1. Federal and California Ambient Air Quality Standards

		California Standards[a]	National Standards[b]	
Pollutant	**Averaging Time**	**Concentration**	**Concentration Primary[c,d]**	**Concentration Secondary[c,e]**
Ozone	1 hour	0.09 ppm (180 µg/m^3)	0.12 ppm (235 µg/m^3)	Same as primary
	8 hour	---	0.08 ppm (157 µg/m^3)	Same as primary
Carbon monoxide	8 hour	9.0 ppm (10 mg/m^3)	9.0 ppm (10 mg/m^3)	---
	1 hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/m^3)	---
Nitrogen dioxide	Annual arithmetic mean	---	0.053 ppm (100 µg/m^3)	Same as primary
Sulfur dioxide	1 hour	0.025 ppm (655 µg/m^3)	---	---
	3 hours	---	---	0.5 ppm (1,300 µg/m^3)
	24 hour	0.04 ppm (105 mg/ m^3)	0.14 ppm (365µg/m^3)	---
	Annual arithmetic mean	---	0.03 ppm (80 µg/m^3)	---
Particulate matter as PM_{10}	24 hour	50 µg/m^3	150 µ/m^3	Same as primary
	Annual (arithmetic mean)	20 µg/m^3	50 µg/m^3	Same as primary
Particulate matter as $PM_{2.5}$	24 hour	----	65 µg/m^3	Same as primary
	Annual arithmetic	---	15 µg/m^3	Same as primary
Lead	Quarterly average	---	1.5 µg/m^3	Same as primary
	30-day average	1.5 µg/m^3	---	---
Visibility Reducing Particles	8 hour	Extinction coefficient of 0.23 per kilometer – visibility of 10 miles or more due to particles when relative humidity is less than 70 percent	---	---
Sulfates	24 hour	25 µg/m^3	---	---
Vinyl Chloride	24 hour	0.01 ppm (26 µg/m^3)	---	---
Hydrogen sulfide	1 hour	0.03 ppm (42 µg/m^3)	---	---

Source: (DoD, 2002a), EPA, 2003a, and California Environmental Protection Agency, Air Resource Board, 2003

[a] These standards must not be exceeded in areas where the general public has access.

[b] These standards, other than for ozone, particulate matter, and those based on annual averages, must not be exceeded more than once per year. The 8-hour ozone standard is attained when the fourth highest 8-hour concentration in a year, averaged over 3 years, is equal to or less than the standard. For PM_{10}, the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above the standard is equal to or less than one. For $PM_{2,5}$, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over 3 years, are equal to or less than the standard.

[c] Concentration is expressed in units in which it was adopted and is based on a reference temperature of 25 °C and a reference pressure of 760 millimeter of mercury. All air quality measurements must be corrected to a reference temperature of 25 °C and a reference pressure of 760 millimeter of mercury (1,013.2 millibars); parts per million (ppm) in this table refers to volume or micromoles of pollutant per mole of gas.

[d] National primary standards are the levels of air quality necessary, with an adequate margin of safety, to protect the public health.

[e] National secondary standards are the levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

[f] Micrograms per cubic meter

[g] Parts per million by volume or micromoles per mole of gas

If a NAAQS standard is exceeded, the EPA requires the preparation of a State Implementation Plan (SIP) that describes the manner in which the state will meet or attain the NAAQS. The SIP contains emission limitations as well as record keeping and reporting requirements for affected sources. As a result of the CAA Amendments, the requirements and compliance dates for reaching attainment are based on the severity of the air quality standard violation. A Federal agency cannot support an action (e.g., fund,

license) unless the activity will conform to the recent EPA-approved SIP for the region. This is called a conformity determination or analysis. A conformity analysis may involve performing air quality modeling and implementing measures to mitigate the air quality impacts. The Federal government is exempt from the requirement to perform a conformity analysis if two conditions are met:

1. The ongoing activities do not produce emissions above the de minimis levels specified in the rule. Table 3-2 shows the de minimis threshold levels of various non-attainment areas.

2. The Federal action must not be considered a regionally significant action. A Federal action is considered regionally significant when the total emissions from the action equal or exceed 10 percent of the air quality control area's emissions inventory for any criteria pollutant.

Table 3-2. De Minimis Thresholds in Non-Attainment Areas

Pollutant	Degree of Non-Attainment	De minimis Level (metric tons/year (tons/year))
Ozone (VOCs and NO_x)	Serious	45 (50)
	Severe	23 (25)
	Extreme	9 (10)
	Marginal/Moderate (outside ozone transport region)	45 (50 VOC)
	Marginal/Moderate (inside ozone transport region)	91 (100 NO_x)
CO	All	91 (100)
PM	Moderate	91 (100)
	Serious	64 (70)
SO_2 or NO_2	All	91 (100)
Pb	All	23 (25)

Source: EPA regulations 40 CFR 93.153(b)

To determine the effects of air emission sources on the ambient air concentrations, air quality modeling is usually conducted. The types and amounts of pollutants, the topography of the air basin, and the prevailing meteorological conditions are considered in modeling the air quality concentrations. The meteorological parameters that most often affect pollutant dispersion are wind speed, wind direction, atmospheric stability, mixing height, and temperature.

3.2.2 Existing Conditions

Climate

The Mojave Airport is located in an arid region. The climate is characterized by hot summers and cool winters. The region is surrounded by several mountain ranges that

greatly limit precipitation. The air quality is influenced by mountain passes that help transport some air pollutants into the region. Temperature data from nearby Edwards AFB indicate average annual precipitation of 12.4 centimeters (4.9 inches) and annual average temperature of 17 degrees Celsius (^{o}C) (62 degrees Fahrenheit (^{o}F)). For January, the daily mean high and low temperatures are 14 and -0.6 ^{o}C (57 and 31 ^{o}F), respectively. For July, the daily mean high and low temperatures are 37 and 19 ^{o}C (98 and 66 ^{o}F), respectively. The prevailing winds are from the southwest. Winds are strongest in the spring and summer, and are calm during the fall and winter. (DoD, 2002a)

On Site

The existing aircraft operations at the Mojave Airport contribute to the condition of air quality in the region. Table 3-3 provides a summary of current aircraft emissions at the Mojave Airport.

Table 3-3. Estimated Aircraft Emissions Annually from Mojave Airport

Aircraft	Percent Use	Flights per year	Estimated Emissions in kilograms/year (pounds/year)					Representative Aircraft used in Calculation
			CO	NO_x	VOC	Sulfur Oxides (SO_x)	PM	
Single-engine	60.6	11,090	41,853 (92,269)	101 (222)	1,157 (2,551)	0	0	Cessna 150
Twin-engine	18.7	3,422	51,378 (113,268)	202 (445)	1,785 (3,935)	0	0	Cessna Skymaster
Turboprop	14	2,562	8,321 (18,344)	953 (2,101)	5,904 (13,015)	209 (461)	0	Beech B99 Arliner
Military Jet	3.9	714	10,441 (23,019)	3,524 (7,768)	1,600 (3,527)	473 (1,042)	10986 (24,219)	F-4 Phantom
Airline Jet	2.8	513	13,019 (28,702)	6,897 (15,205)	3,128 (6,895)	761 (1,678)	272 (600)	Boeing 727
Total		**18,301**	**125,011 (275,603)**	**11,676 (25,741)**	**13,573 (29,923)**	**1,443 (3,181)**	**11,258 (24,819)**	

Source: EPA, 1980 and Kern County, 2003c

There are also emissions from the tank farm, which has seven tanks containing a total of 503,460 liters (133,000 gallons) capacity. Typically 109,000 gallons of Jet-A fuel is stored at the airport. According to the Spill Prevention Control and Countermeasures (SPCC) Plan for EKAD-Mojave California (EKAD, 2003), several of the tanks are above ground tanks permitted to store and dispense Jet-A fuel and gasoline at Mojave Airport. Table 3-4 outlines the tank capacity, and corresponding VOC emission rates.

Table 3-4. Maximum Estimated VOC Emissions from Above Ground Tanks at Mojave Airport

Tank Type	Tank Capacity liters (gallons)	VOC Emission Rates kilograms (pounds) per day
Jet-A fuel storage and dispensing	113,562 (30,000)	3.58 (7.89)
Jet-A fuel storage and dispensing	124,919 (33,000)	2.24 (4.93)
Aviation fuel gasoline storage and dispensing	45,425 (12,000)	0.17 (0.38)
Total	283,906 (75,000)	6.0 (13.2)
Annual VOC Emissions kilograms (pounds)	-	2,185 (4,818)

Off Site

Baseline Condition. Table 3-5 provides current and estimated baseline emissions for the Kern County Air Pollution Control District (KCAPCD).

Table 3-5. Kern County Emissions Baseline and Forecasted Emission Baseline (metric tons/year (tons/year))

Year	VOCs	NO_x	PM_{10}
1990[a]	5,463.6 (6,022.5)	NA	23,177 (25,548)
1996[b]	4,486.7 (4,945.7)	12,910.6 (14,231.3)	15,720 (17,328)[c]
1999[b]	4,516.6 (4,978.6)	13,437.2 (14,811.7)	NA

[a] Actual
[b] Estimated
[c] PM_{10} estimated for 1994
Source: KCAPD 1993, 1994a, 1994b, 1996, 1997, and 2000

Attainment Status. The CARB has delegated responsibility for regulating stationary emission sources to local air agencies. The Mojave Airport is located within the KCAPCD. Eastern Kern County is in Federal non-attainment (serious) and state non-attainment (moderate) for ozone. (EPA, 2003b) In an effort to reach attainment status, KCAPCD has developed several planning documents including the Federal Ozone Attainment Demonstration Plan (KCAPCD, 1994c), which have been approved by the EPA and included in the California Ozone SIP. The documents outline baseline and future regional emission inventories, mandated emission reductions, and computer modeling to attain the Federal ozone standard. (DoD, 2002a) Kern County has also developed the California Clean Air Act Kern County Ozone Air Quality Attainment Plan (November 15, 2000). Table 3-6 indicates the attainment status of pollutants in the KCAPCD (Eastern County).

Table 3-6. KCAPCD (Eastern County) Attainment Status

Pollutant	California Standard	Federal Standard
Ozone	Non-attainment (moderate)	Non-attainment (serious)
CO	Unclassified	Unclassified
NO_2	Attainment	Unclassified
SO_2	Attainment	Unclassified
PM_{10}	Non-attainment	Unclassified
Pb	Attainment	Attainment
$PM_{2.5}$	Not applicable	Not determined[10]
HS	Attainment	Not applicable
Sulfates	Attainment	Not applicable

Source: California Environmental Protection Agency, Air Resources Board, 2000, EPA, 2003b and Kern County, 2003b

The sources of pollution in eastern Kern County are not solely responsible for exceeding the Federal ozone standards. Ozone and ozone precursor emissions are transported from both the San Joaquin Valley Air Basin and the South Coast Air Basin into Eastern Kern County. The mountains that surround Kern County channel air pollutants through the passes. In addition, although eastern Kern County does not have large urban centers, which would be sources of air pollution, it does have several Portland cement plants that are major NO_x emission sources. The PM_{10} levels are primarily the result of fugitive dust, which is produced from high winds, dry soils and activities associated with mining, agriculture, and construction. (DoD, 2002a)

The CARB has operated a KCAPCD-owned ozone monitoring station at Mojave Airport since 1993. Table 3-7 lists peak ozone concentrations at Mojave Airport.

Table 3-7. Peak Concentrations (ppm) of Ozone 1994-1999

Year	1994	1995	1996	1997	1998	1999
Concentration (ppm)	0.122	0.121	0.124	0.121	0.124	0.121

Source: KCAPCD, 2000

3.3 Airspace

3.3.1 Definition of Resource

Airspace is the defined space above a nation, which is under its jurisdiction. Airspace is limited horizontally, vertically, and temporally, and is regulated by the FAA. (DoD, 2002a) The FAA has developed specific classifications for airspace to establish limits on its use. These classifications include controlled and uncontrolled airspace, special use

[10] EPA cannot begin to implement 1997 fine particulate matter standards until the EPA and states collect three years of monitoring data to determine which areas are not attaining the standards. The fine particle monitoring network was completed in 2000. In most cases, attainment and non-attainment decisions will not be made until 2004-2005.

airspace, military training routes, en route airways and jet routes, airports and airfields, and air traffic control. (DoD, 2002a)

Controlled and Uncontrolled Airspace. The FAA categorizes airspace within the U.S. as controlled or uncontrolled. Controlled airspace requires air traffic control (ATC) services for instrument flight rules (IFR) flights and for visual flight rules (VFR) flights where applicable. (DoD, 2002a) Operators of aircraft within controlled airspace are subject to specific pilot qualifications, operating rules, and equipment requirements. Controlled airspace can be classified as Class A, B, C, D, or E. (FAA, 2003a) Table 3-8 provides descriptions for the airspace classifications. Uncontrolled airspace is for aircraft operating under VFR and is not classified by the FAA. Uncontrolled airspace can extend up to 4,420 meters (14,500 feet) above mean sea level (MSL) and is referred to as Class G airspace. (DoD, 2002a) Figure 3-4 displays the controlled airspace classifications.

Table 3-8. Airspace Classification Descriptions

Classification	Controlled or Uncontrolled	Description
Class A	Controlled	Includes U.S. airspace overlying the waters within 22 kilometers (12 nautical miles) of the coast of the 48 contiguous states from 5,486 meters (18,000 feet) above MSL up to and including flight level (FL) 600 (18,288 meters or 60,000 feet above MSL). Excludes Alaska, Hawaii, Santa Barbara Island, Farallon Island, and the airspace south of latitude 25 degrees 04 minutes 00 seconds North.
Class B	Controlled	Ranges from the surface to 3,049 meters (10,000 feet) above MSL surrounding the nation's busiest airports in terms of IFR operations or passenger enplanements. Individually tailored and consists of a surface area and two or more layers, and is designed to contain all published instrument procedures once an aircraft enters the airspace.
Class C	Controlled	Ranges from the surface to 1,220 meters (4,000 feet) above the airport elevation and surrounding those airports that have an operational control tower, that are serviced by a radar approach control, and that have a certain number of IFR operations or passenger enplanements. Usually consists of a surface area with a 9 kilometers (5 nautical mile) radius, and an outer circle with a 19 kilometers (10 nautical mile) radius that extends from 366 meters (1,200 feet) to 1,220 meters (4,000 feet) above the airport elevation.
Class D	Controlled	Ranges from the surface to 762 meters (2,500 feet) above the airport elevation and surrounding those airports that have an operational control tower. Individually tailored, and when instrument procedures are published, the airspace will normally be designed to contain the procedures.
Class E	Controlled	Generally defined as any controlled airspace that is not Class A, B, C, or D and includes uncontrolled airspace above FL600.
Class G	Uncontrolled	Airspace that is not classified by the FAA

Source: DoD, 2002a

Special Use Airspace. Special use airspace is airspace where limitations are placed upon aircraft "activities because of their nature and/or wherein limitations may be imposed upon aircraft operations that are not a part of those activities." (FAA, 2003a) Examples of special use airspace are alert areas, controlled firing areas, MOAs, prohibited areas, restricted areas, and warning areas. (DoD, 2002a)

Military Training Routes. The FAA defines military training routes as airspace "of defined vertical and lateral dimensions established for the conduct of military flight training at airspeeds in excess of 250 knots (287 miles per hour)." (FAA, 2003a)

En route Airways and Jet Routes. En route airways and jet routes are established IFR flight paths used by commercial and private aircraft. However, the FAA is gradually allowing pilots to develop their own flight plans that follow more efficient and economic routes. (DoD, 2002a)

Airports and Airfields. Airports and airfields are terms that describe "an area on land or water that is used or intended to be used for the landing and takeoff of aircraft and includes its buildings and facilities." (FAA, 2003a)

ATC. The FAA defines ATC as a "service operated by appropriate authority to promote the safe, orderly and expeditious flow of air traffic." (FAA, 2003a)

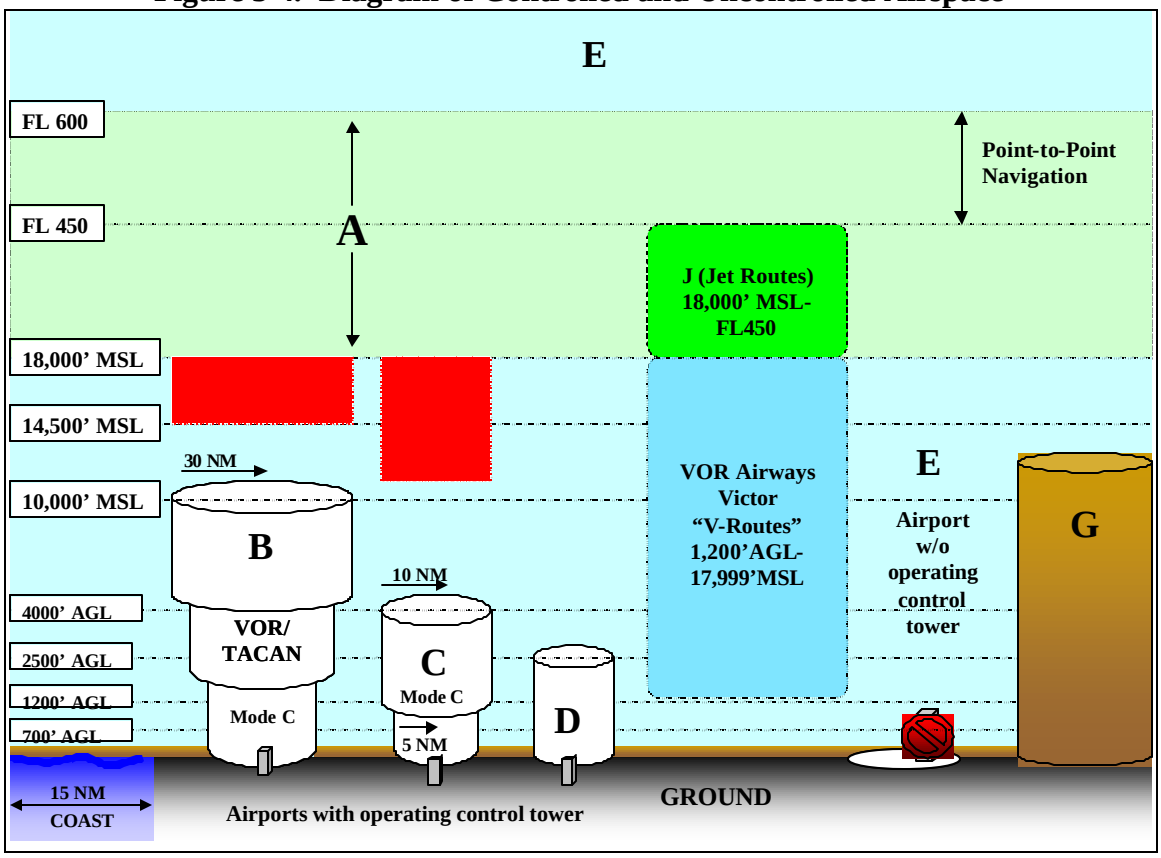
3.3.2 Existing Conditions

On Site

Controlled and Uncontrolled Airspace. The Mojave Airport is classified as Class D airspace within an 8.0-kilometer (4.3 nautical mile) radius of the airport and from the surface up to 1,463 meters (4,800 feet) MSL when the control tower is in service. (LOA TRACON, 1996) At all other times the airspace is classified as Class G and E. (Mojave Airport, 2003c)

Special Use Airspace. The Mojave Airport is located within the R-2508 Complex, which is jointly managed and used by the Naval Air Weapons Center, Weapons Division, China Lake, CA; National Training Center, Fort Irwin, CA; and Air Force Flight Test Center, Edwards AFB, CA. The R-2508 Complex covers approximately 51,800 square kilometers (20,000 square miles) extending 225 kilometers (140 miles) north to south from Bishop, CA to Edwards AFB and 177 kilometers (110 miles) west to east from Bakersfield, CA to the Nevada state line. (DoD, 2002a) The R-2508 Complex is made up of MOAs, Restricted Areas, and ATCAA. Figure 3-5 shows the location of the R-2508 Complex. Aircraft activities in the R-2508 Complex are restricted due to unusual or unseen hazards in the area. Within the R-2508 Complex, there are several restricted area designations, R-2515, R-2505, R-2506, R-2524, R-2502N, and R-2502E. The air traffic control agency in the R-2508 Complex is the High Desert Terminal Radar Approach Control (HI-DESERT TRACON) except for the Bakersfield MOA, which is controlled

Figure 3-4. Diagram of Controlled and Uncontrolled Airspace



by the Los Angeles Air Route Traffic Control Center (ARTCC). (DoD, 2002a) The Mojave Airport control tower has an LOA with HI-DESERT TRACON for coordinating flight activities in the R-2508 Complex. (LOA TRACON, 1996) The Mojave Airport control tower also has an LOA with the SPORT Radar Control Facility for coordinating flight activities in R-2515. (LOA SPORT, 1994) These LOAs detail the procedures and requirements for the Mojave Airport control tower and aircraft operating within the R-2508 Complex and R-2515. The FAA issued a waiver to the EKAD in 2002 to operate aircraft in the R-2508 Complex for

- Speeds in excess of 463 kilometers per hour (250 knots) indicated airspeed (IAS) below 3,049 meters (10,000) feet MSL, and
- Speeds in excess of 370 kilometers per hour (200 knots) IAS within Mojave Airport Class D airspace.

The MOAs have vertical and horizontal limits established to maintain aircraft separation from IFR flight traffic. The Mojave Airport is located solely within the Isabella MOA. (Kern County, 2003c) See Figure 3-5 for a map of the MOAs. The Mojave Airport is not located within any warning, prohibited, restricted, or alert special use airspace. The R-2508 restricted airspace starts at FL200 (6,096 meters MSL [20,000 feet]) and extends upward. The Mojave Class D airspace only goes to 1,463 meters MSL (4,800 feet).

Military Training Routes, En Route Airways, and Jet Routes. No military training routes, en route airways or jet routes, or airports or airfields are located within the Mojave Airport airspace. (DoD, 2002a)

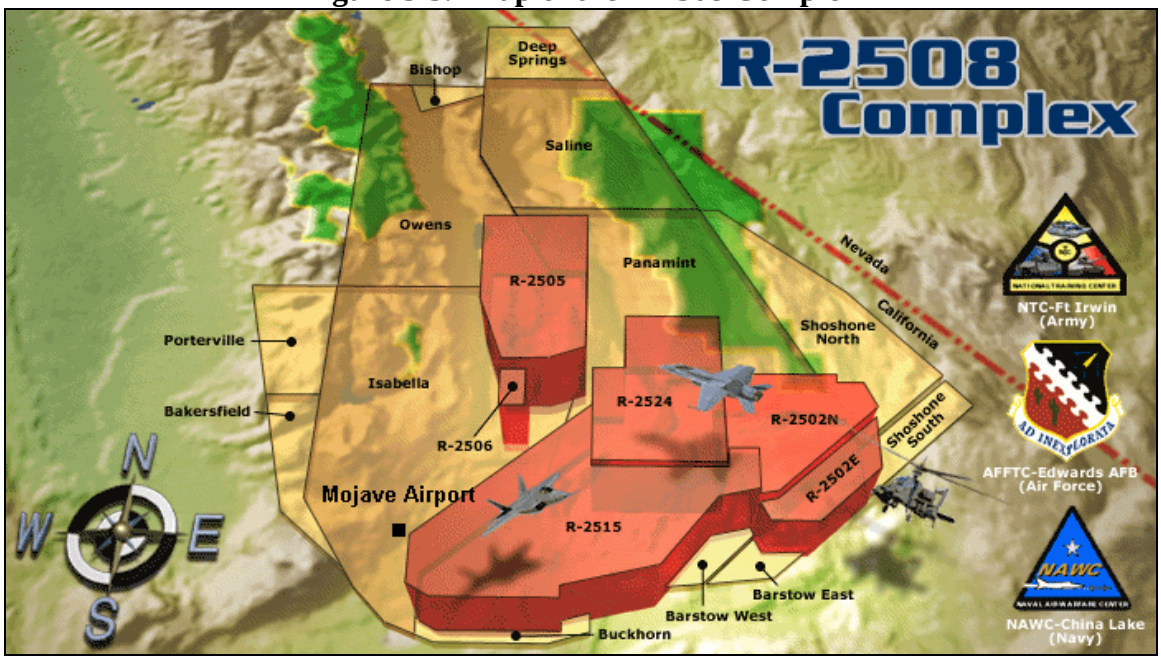
ATC. The Mojave Airport has an air traffic control tower on site that provides VFR services. The control tower is in operation Monday through Friday from 7 am to 5 pm. (Mojave Airport, 2003a) Because the Mojave Airport is located in the R-2508 Complex, it maintains regular communication with HI-DESERT TRACON and SPORT to coordinate aircraft activities.

Off Site

Controlled and Uncontrolled Airspace. The airspace within the ROI is Class A, Class D, or Class E controlled airspace, unless otherwise classified as special use airspace as described below. Within these controlled airspaces, ATC (HI-DESERT TRACON, SPORT, or Los Angeles ARTCC) will provide separation services to IFR aircraft. (DoD, 2002a) Separation services will be provided to VFR aircraft to the extent practical.

Special Use Airspace. The ROI would be within the R-2508 Complex. Flight coordination would occur as described in the on-site restricted areas discussion. The ROI would include portions of the Isabella, Buckhorn, Barstow, and Panamint MOAs and the R-2515. See Figure 3-5 for a map of the MOAs.

Figure 3-5. Map of the R-2508 Complex



Source: Edwards AFB, 2003

Edwards AFB has a Western Approach Reentry Corridor for unmanned lifting entry vehicles (LEV). (DoD, 2002a) The corridor extends from the heading alignment circle at

Edwards AFB along the 250° and 290° radials and continues out to approximately 8,045 kilometers (5,000 miles) west of Edwards AFB. (DoD, 2002a) Figure 3-6 shows the Edwards AFB Western Approach Reentry Corridor. At the California coastline, the corridor is approximately 225 kilometers (140 miles) wide. The estimated altitude of the LEV is 13,716 meters (45,000 feet) above MSL when the LEV is within eight kilometers (five miles) west of Edwards AFB. (DoD, 2002a) The ROI would include the eastern most tip of the Western Approach Reentry Corridor. No warning, prohibited, or alert special use airspace would be within the ROI.

Controlled Firing Areas. Three controlled firing areas are located in the proposed ROI. The northeastern most area of the ROI includes the southern tip of the China Lake NAWS North Range (R-2505) and the southwest portion of the NAWS South Range (R-2524). (Kern County, 2003c) These two ranges are within the R-2508 Complex and extend from the ground level to an unlimited altitude. The Trona Corridor controlled firing area is located between the R-2505 and R-2524 zones and extends from 914 meters (3,000 feet) above ground level to FL200 (6,098 meters or 20,000 feet above MSL). The controlled firing ranges are shown in Figure 3-5.

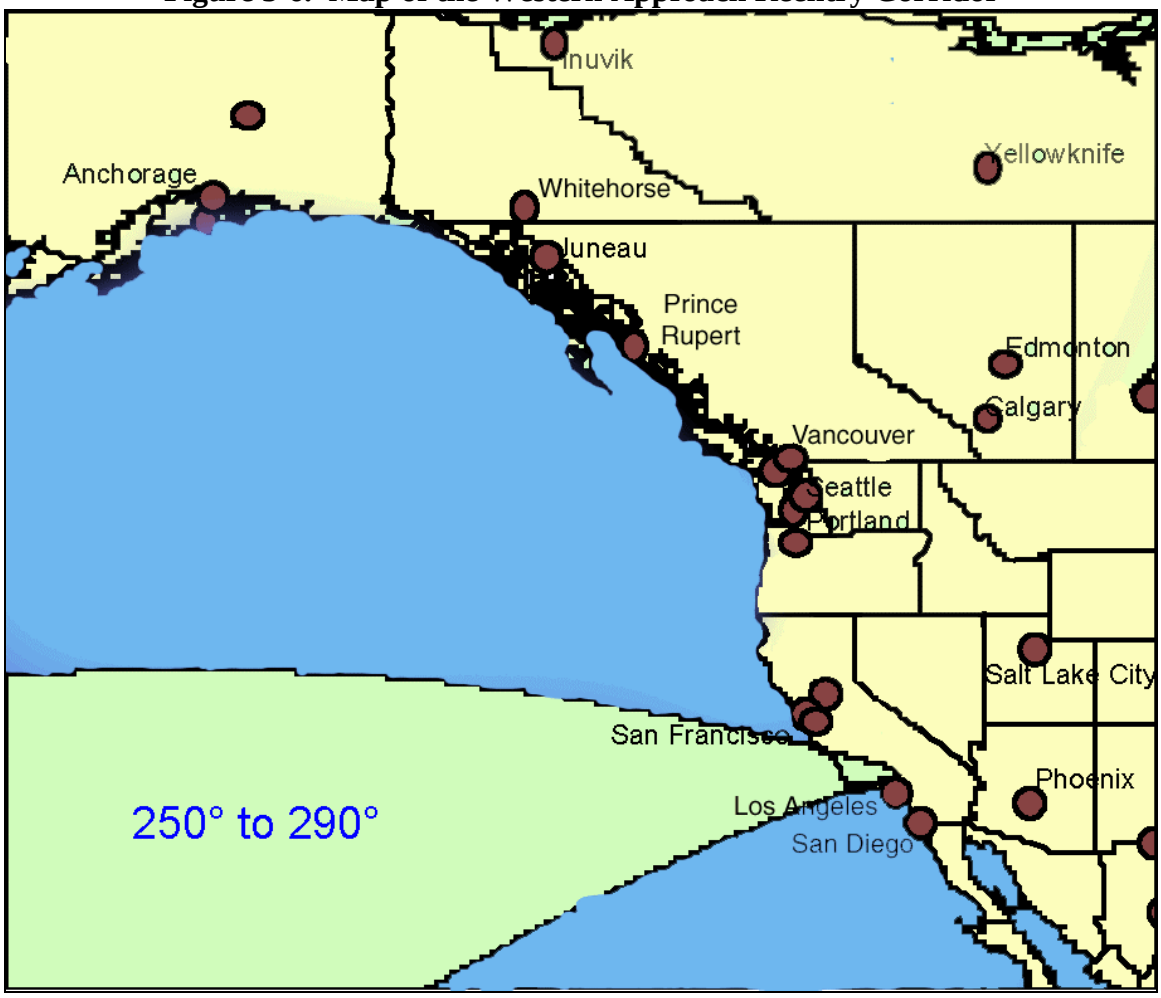
Military Training Routes. There are several military training routes in the R-2508 Complex. The R-2508 Complex is VFR only and operates on a "see and avoid" basis to ensure aircraft separation. (DoD, 2002a) The ROI will cross several military training routes including IR200, IR211, IR425, IR236, VR1205, VR1206, VR1214, VR1215, VR1218, VR1262, and VR1265.

En Route Airways and Jet Routes. Several en route airways and jet routes, V8-21, V283-587, V12, V210, V386, V442 are located within the ROI.

Airports and Airfields. A number of public and private airports and airfields lie within or near the ROI. Within California from west to east, they are Rosamond, California City, Inyokern, Edwards AFB, Borax, China Lake NAWS, Boron, Hansen, Adelanto, Sun Hill, Southern California Logistics, Apple Valley, Osborne, Holiday, Rabbit, Depue, and Trona. (Maps.com, 2003)

ATC. The primary ATC agency for the R-2508 Complex is the HI-DESERT TRACON. (DoD, 2002a) The HI-DESERT TRACON controls the R-2508 Complex when the Complex is "Active" for military use and when some or the entire Complex is "Released" for joint use. At this time, the NAS has not set an upper limit to define FAA's responsibilities for vehicles transitioning to and from space. However, a limit may be set by the NAS in 2005. (DoD, 2002a)

Figure 3-6. Map of the Western Approach Reentry Corridor



Source: DoD, 2002a

3.4 Biological Resources

3.4.1 Definition of Resource

Native or naturalized vegetation, wildlife, and the habitats in which they occur are collectively referred to as biological resources. Biological resources include vegetation, wildlife, threatened and endangered species, and environmentally sensitive habitats. Key laws and regulations that govern the protection of biological resources are described below.

Federal Endangered Species Act

The U.S. Fish and Wildlife Service (USFWS) administers the Endangered Species Act of 1973 (16 USC 1531 et seq.), which states that all Federal departments and agencies shall seek to conserve endangered species and threatened species. Under the Endangered Species Act, the Secretary of the Interior creates lists of endangered and threatened species. Endangered species means any plant or animal species that is in danger of

extinction throughout all or a significant portion of its range. The act defines a threatened species as any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. Species on either of these lists are afforded special protection.

Sensitive species include those species identified by the USFWS as candidates for possible listing as threatened or endangered pursuant to the Endangered Species Act. Candidate species are those for which the USFWS has obtained substantial information on biological vulnerability and threats to support proposals to list the species as endangered or threatened.

Critical habitat for a threatened or endangered species is defined as specific areas within the geographical area occupied by the species at the time it is listed, which contain the physical or biological features essential to conservation of the species and may require special management considerations or protection. Critical habitat also includes specific areas outside the geographic area occupied by the species at the time it is listed that are essential to conservation of the species.

California Endangered Species Act

The California Department of Fish and Game (CDFG) administers the California Endangered Species Act. The State of California considers an endangered species one whose prospects of survival and reproduction are in immediate jeopardy. An endangered species is in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes, including loss of habitat, change in habitat, predation, competition, or disease. A threatened species is one likely to become an endangered species in the near future in the absence of special protection or management because it is present in such small numbers throughout its range. A rare species is present in such small numbers throughout its range that it may become endangered if its present environment worsens. The CDFG considers a candidate species one formally under review by the department for addition to either the endangered species list or threatened species list.

The CDFG uses the informal designation "species of special concern" to designate some declining wildlife species that are rare but are not candidates for listing as threatened or endangered. The designation does not provide legal protection but signifies that these species are recognized as sensitive by the CDFG. Some of these, i.e., migratory birds, may be protected under other laws such as the Migratory Bird Treaty Act.

Other Federal Regulations

The Fish and Wildlife Coordination Act of 1958 (16 USC 661 et seq.), encourages all Federal departments and agencies to utilize their statutory and administrative authority, to the maximum extent practicable and consistent with each agency's statutory responsibilities, to conserve and promote conservation of non-game fish and wildlife and their habitats.

The Migratory Bird Treaty Act of 1918, as amended (16 USC 703-712) protects most species of migratory birds. Specifically, the act prohibits the pursuit, hunting, taking, capture, possession, or killing of such species or their nests and eggs.

The Bald and Golden Eagle Protection Act (16 USC 668 et seq.) establishes penalties for the unauthorized taking, possession, selling, purchase, or transportation of bald or golden eagles, their nests, or their eggs. Any Federal activity that might disturb eagles requires consultation with the USFWS for appropriate mitigation.

Other State and Local Regulations

Under Section 2081 of the State Fish and Game Code, the CDFG may authorize individuals or public agencies to import, export, take, or possess, any state-listed endangered, threatened, or candidate species. These otherwise prohibited acts may be authorized through permits or memoranda of understanding if

- The take is incidental to an otherwise lawful activity,
- Impacts of the authorized take are minimized and fully mitigated,
- The permit is consistent with any regulations adopted pursuant to any recovery plan for the species, and
- The applicant ensures adequate funding to implement the measures required by CDFG.

The Native Plant Protection Act includes measures to preserve, protect, and enhance rare and endangered native plants. The definitions of "rare and endangered" differ from those contained in the California Endangered Species Act. However, the list of native plants afforded protection pursuant to this Act includes those listed as rare and endangered under the California Endangered Species Act.

The West Mojave Plan aims to define a process for complying with threatened and endangered species laws. The plan will also provide a streamlined permitting process and define consistent mitigation measures and compensation obligation.

The Mojave Specific Plan provides objectives and policies intended to protect biological resources. For conservation, it is essential to maintain and promote the retention of natural settings and use of native of adaptable vegetation. For open space, it is necessary to ensure that development expands without adversely impacting significant natural resources on lands within the Resource Management designation. The Specific Plan also describes implementation actions to ensure that these goals and policies are carried out in a timely manner. Implementation of the Mojave Specific Plan would not affect local policies or ordinances protecting biological resources or provisions of an adopted Habitat Conservation Plan or Natural Community Plan.

3.4.2 Existing Conditions

The Mojave Airport is situated on the western portion of the Mojave Desert and consists largely of developed property. The region surrounding the airport, however, is rich in

biological diversity because of its varied vegetation communities, distinct landforms, and location adjacent to the Transverse Ranges, the Sierra Nevada, the Colorado Desert, and the Great Basin. There are no permanent, naturally occurring surface waters or open freshwater systems in the region. Neither the Mojave Specific Plan nor the Draft EIS/EIR for the West Mojave Plan identified the presence of Federally protected wetlands, as defined by section 404 of the Clean Water Act, at the Mojave Airport. As a result, jurisdictional wetlands would not be affected by the proposed activities at the airport.

Vegetation

The Mojave Specific Plan indicates that native vegetation formations within the planning area roughly follow a terrain- and soil-dependent gradient from west to east, which extends down slope from the Tehachapi foothills across the Mojave basin toward Rogers Dry Lake. The Mojave Airport and the surrounding land located east of the airport are generally level across the plains.

The eastern region surrounding the Mojave Airport consists of Mojave creosote bush scrub, which may be intermixed with chenopod scrub formations. Creosote scrub is characterized by creosote bush and types of creosote scrub vary widely. On disturbed sites, creosote scrub is described as open, non-grassland, herbaceous vegetation that grows in rubbish, or on poor land, whereas in other areas, relatively intact scrub formations may be intermixed with other native shrub and grass species. The Mojave Specific Plan noted that some creosote scrub areas annually exhibit brief, dense wildflower displays, however, this typically occurs in areas where disturbance levels are low or not recent. The occurrence of creosote clonal rings may be unique to the Mojave creosote scrub formation, but these biological features are not formally protected, and are not present on the Mojave Airport property.

Joshua tree habitats dominate the western margins of the Mojave Specific Plan area and may be observed in western portions of the Mojave Airport region. Often Joshua trees are the only tree-structure plant species observed within upper Mojave Desert habitats. Joshua tree woodland formations, albeit rare, and mixed formations of Joshua tree and creosote scrub formations may occur, both of which offer a large variety of niches and habitats. The presence of only a few Joshua trees within a desert scrub formation is sufficient to provide shelter, additional food resources, shade, escape habitat for small vertebrates, and nesting sites for a variety of birds. There are no local policies or ordinances for tree preservation.

Federally protected wetlands are not located at the Mojave Airport. The Draft EIS/EIR for the West Mojave Plan indicates that protection of alkali wetland communities, including seeps, springs, meadows and playas, is a top priority. The plan indicates that these sites are very likely to result in new discoveries of disjunctive and endemic species of rare plants.

Wildlife

Potential wildlife in the Mojave Airport region includes invertebrates, reptiles, mammals, and migrant and local birds. Fish are not present in this area due to low rainfall (average thirteen centimeters [five inches] per year) and intermittent streams. The diverse vegetation formations in the region surrounding the Mojave Airport support wildlife at variable levels. Generally, habitats differ according to soil characteristics; annual plant diversity and density; slope and orientation to sunlight and wind; shrub cover density and diversity; and (where present) Joshua tree age classes and density. For example, the presence or absence of sensitive wildlife species such as the desert tortoise and Mohave ground squirrel may be determined by: soil characteristics (burrow support); groundcover (wind sheltering by shrubs); seasonal hydrology (flooding or ponding); and/or annual vegetation production (food resources). Both the desert tortoise and Mohave ground squirrel have historically occurred throughout the ROI and have limited potential to occur almost anywhere within the Mojave Specific Plan area. (Kern County, 2003b)

In the Mojave Airport region, general wildlife habitat values are typically highest within intact Joshua tree woodland formations and mixed formations of Joshua tree and creosote scrub formations, and lowest within chenopod scrub formations that have limited shrub species diversity.

The Mojave Specific Plan noted that the community of Mojave might lie within a historic wildlife movement zone between the Tehachapi foothills and dry lake playas. Because habitat values change dramatically between these two areas, this alleged linkage may have served only a few larger, more mobile species on a direct movement basis. The Specific Plan assessment of wildlife movement was presumptive, however, because no studies of wildlife movement within the planning area were identified during literature searches.

Potentially Sensitive Species

The Mojave Specific Plan establishes long-term land use policies for a large planning area that includes the Mojave Airport. The Mojave Specific Plan identifies the Mojave Airport as part of an "urbanized, non-sensitive" area where a biological survey would not be required. These "urbanized, non-sensitive" areas have been developed, previously surveyed, or subject to mitigation for sensitive species. Although the Mojave Airport is considered an "urbanized, non-sensitive" area where a biological assessment is not required, this section will describe sensitive species common to the surrounding region, including those species observed at the airport.

The USFWS Ventura Fish and Wildlife Office is responsible for establishing lists of threatened and endangered species for the desert portions of Kern County. Table 3-9 provides the species listed, proposed, or identified as candidate species that may occur in the ROI.

Table 3-9. Listed, Proposed, and Candidate Species That May Occur in the ROI

	Common Name	Federal Status[1]	State Status[1]	Scientific Name
Birds	Bald Eagle	T	E	*Haliaeetus leucocephalus*
	California Condor*	E, CH	E	*Gymnogyps californianus*
	Least Bell's Vireo	E	E	*Vireo bellii pusillus*
	Yellow-billed Cuckoo	C	-	*Coccyzus americanus*
	Swainson's Hawk	-	T	*Buteo swainsoni*
	Southwestern Willow Flycatcher	E	-	*Empidonax traillii extimus*
Amphibians	California Red-legged Frog	T	-	*Rana aurora draytonii*
	Arroyo Toad	E	-	*Bufo californicus*
Reptiles	Desert Tortoise	T, CH	T	*Gopherus (=Xerobates) agassizii*
Fish	Mojave Tui Chub	E	E	*Gila bicolor mohavensis*
Plants	Cushenberry Buckwheat	E	-	*Erigonum ovalifolium var. vineum*
	Cushenberry Milkvetch	E	-	*Astragalus albens*
	Kelso Creek Monkeyflower	PE	-	*Mimulus shevockii*
	Lane Mountain Milkvetch	E	-	*Astragalus jaegerianus*
	Parish's Daisy	T	-	*Erigeron parishii*
	Mojave tarplant	-	E	*Hemizonia mohavensis*
Mammal	Mohave Ground Squirrel	-	T	*Spermophilus mohavensis*

[1] E = Endangered, T = Threatened, CH = Critical Habitat, PE = Taxa proposed for listing as endangered, C = Candidate for which the Fish and Wildlife Service has on file sufficient information on the biological vulnerability and threats to support proposals to list as endangered or threatened.
Source: Adapted from U.S. Department of the Interior, 2003 and California Department of Fish and Game, 2003.
* Species with an asterisk denote species for which Ventura Fish and Wildlife Office has the lead.

The Mojave Specific Plan lists potentially sensitive species in the Mojave planning area, which are provided in Table 3-10. Sensitive species include those classified formally according to Federal and state regulations and informally such as CDFG species of special concern. The Mojave Specific Plan also includes a biological resource assessment that discusses sensitive resources in greater detail.

Table 3-10. Potentially Sensitive Species in the Mojave Specific Plan Area

Species Type	Common Name
Plants	Alkali mariposa lily
	Barstow woolly sunflower
	Desert cymopterus
	Mohave tarplant
	Pygmy poppy
	Mojave spineflower
	Sagebrush loeflingia
Invertebrates	Mojave blister beetle
Reptiles	Desert tortoise
	Rosy boa
Mammals	Insectivorous bats
	Mohave ground squirrel
	American badger
Birds	Golden eagle
	Swainson's hawk
	Ferruginous hawk
	Northern harrier
	Prairie falcon
	Cooper's hawk
	Long-eared owl
	Short-eared owl
	Western burrowing owl
	Loggerhead shrike
	LeConte's thrasher
	Bendire's thrasher
	Virginia's warbler

Source: Adapted from Kern County, 2003e

Both the desert tortoise and Mohave ground squirrel are agency-listed, sensitive wildlife species. The desert tortoise has the potential to occur almost anywhere within the Mojave Specific Plan area and the Mohave ground squirrel historically occurred throughout the community of Mojave. The presence of desert tortoise or Mohave ground squirrel was not reported in specific plans that were previously prepared for the Mojave community or recent documentation for projects west of the Antelope Valley Freeway. However, there is limited potential for both species to occur nearly anywhere within the Specific Plan area. As a result, although the Mojave Airport is considered an urbanized,

non-sensitive area, appropriate mitigation measures may be taken to ensure protection of both species if individuals are observed on the airport property. (Kern County 2003b)

The desert tortoise is a large, herbivorous reptile that occurs in low densities around the community of Mojave; primarily within creosote scrub and Joshua tree formations see Figure 3-7. The favored habitat for desert tortoises consists of creosote scrub with abundant grasses and other herbaceous vegetation, relatively well-consolidated soils, light terrain, and numerous small dry washes, and elevations of approximately 305 to 914 meters (1,000 to 3,000 feet). On April 2, 1990, the desert tortoise was determined to be a threatened species. A final rule (59 Federal Register 5820), published February 8, 1994, designated desert tortoise critical habitat to identify key biological and physical needs of the species, key areas for recovery, and potential conservation actions.

Figure 3-7. Desert Tortoise

Source: Desert Tortoise Preservation Committee, 2003a

According to the USFWS Sacramento Fish and Wildlife Office, the Mohave ground squirrel is designated threatened by the State of California. (See Figure 3-8.) The Mohave ground squirrel is small, brown, and found only in the Mojave Desert. The species occurs in all major desert scrub habitats in the western Mojave Desert, including creosote scrub, saltbush (chenopod scrub), and Joshua tree woodland. The Mohave ground squirrel typically occupies underground burrows from July or August through February. Determining the status of the Mohave ground squirrel is difficult due to behavioral and demographic aspects of the species, as it is inactive throughout much of the year, and abundance as well as the period of surface activity varies from year to year. Critical habitat has not been designated for the Mohave ground squirrel.

Figure 3-8. Mohave Ground Squirrel

Source: Desert Tortoise Preservation Committee, 2003b

3.5 Cultural, Historic, and Native American Resources

3.5.1 Definition of Resource

Cultural resources include prehistoric and historic artifacts, archaeological sites, historic buildings and structures, and traditional resources (such as Native American religious sites). Paleontological resources are fossil remains of prehistoric plant and animal species and may include bones, shells, leaves, and pollen. Cultural resources of particular concern include properties listed or eligible for inclusion in the National Register of Historic Places (National Register).

Only those cultural resources determined to be potentially significant under 36 CFR 60.4 are subject to protection from adverse impacts resulting from an undertaking. To be considered significant, cultural resources must meet one or more of the criteria established by the National Park Service that would make that resource eligible for inclusion in the National Register. The term "eligible for inclusion in the National Register" includes all properties that meet the National Register listing criteria which are specified in Department of Interior regulations at 36 CFR 60.4. Therefore, sites not yet evaluated may be considered potentially eligible for the National Register and, as such, are afforded the same regulatory consideration as nominated properties. Whether prehistoric, historic, or traditional, significant cultural resources are referred to as historic properties.

Federal Regulations

Numerous laws and regulations require that possible impacts on cultural resources be considered during the planning and execution of Federal undertakings. These laws and regulations stipulate a process of compliance, define the responsibilities of the Federal agency proposing the action, and prescribe the relationship among other involved agencies (e.g., State Historic Preservation Officer, the Advisory Council on Historic Preservation). In addition to NEPA, the primary laws that pertain to the treatment of cultural resources during environmental analysis are the National Historic Preservation Act (16 USC 470 et seq.) especially Sections 106 and 110, the Archaeological Resources

Protection Act of 1979 (16 USC 470aa-470mm), the Antiquities Act of 1906 (16 USC 431), and the Native American Graves Protection and Repatriation Act (25 USC 3001 et seq.).

State and Local Regulations

Section 21084 of the CEQA provides the criteria for defining a historical resource. Section 15064 includes the requirements for determining whether a resource is historically significant and meets the criteria for listing on the California Register of Historical Places.

The California Public Resources Code, Section 5020.4, further describes the criteria for inclusion in the California Register of Historic Places, evaluation of resources less than 50 years old, and responsibilities of the State Historic Resources Commission and the Office of Historic Preservation. Properties on state or private lands are formally identified as significant by being listed in the California Register of Historic Resources or designated as a California Historic Landmark or California Point of Historical Interest. The California Register of Historic Places includes resources formally determined to be eligible for, or listed in, the National Register.

The Health and Safety Code (Section 7052) establishes a felony penalty for disturbing human remains. The California Penal Code (Section 622.5) and California Public Resources Code (Section 5097.5) provide and define, respectively, "misdemeanor penalties for injuring or destroying objects of historical or archeological interest located on public or private lands."

Some local governments also offer designation/registration programs for local properties. The Mojave Specific Plan establishes a policy regarding conservation of cultural resources.

Prior to discretionary and ministerial development of any individual project within the Specific Plan area, a complete search of records and literature and/or a Phase 1 Assessment shall be conducted to identify the presence of any specific cultural resources and/or Native American sacred lands at the project site. Recommendations shall be incorporated into project approval.

These mitigation measures are required to avoid potential impacts on cultural resources within the Specific Plan area, which includes the Mojave Airport.

3.5.2 Existing Conditions

There are 22 sites in Kern County, 385 sites in Los Angeles County, and 52 sites in San Bernardino County that are listed in the National Register of Historic Places, including sites such as the Last Chance Canyon, which has a period of significance that dates back as early as 9000-10999 BC. Table 3-11 shows the listed sites that are within the ROI. Each site's name, location, and date added to the National Register are provided. There are no National Register sites located in the community of Mojave.

Table 3-11. Listed Sites for the National Register of Historic Places in the ROI

Name of Site	Location	Date Added
Burro Schmidt's Tunnel	Ridgecrest	03/20/2003
Last Chance Canyon	Johannesburg	12/5/1972
Rogers Dry Lake	Mojave Desert	10/3/1985
Bitter Spring Archaeological Site (4-SBr-2659)	Barstow	12/20/1982
Fossil Canyon Petroglyph Site	Barstow	3/3/2003
Harvey House Railroad Depot	Barstow	4/3/1975
Rodman Mountains Petroglyphs Archaeological District	Barstow	5/10/1982
CA SBr 1008A, CA SBr 1008B, CA SBr 1008C	Johannesburg	5/24/1982
Squaw Spring Archaeological District	Red Mountain	7/28/1981
Blackwater Well	Red Mountain	11/21/2000

Source: National Park Service, 2003a

There are 28 sites in Kern County, 148 sites in Los Angeles County, and 87 sites in San Bernardino County that may be currently eligible for listing in the National Register of Historic Places. The National Park Service has determined that, of these sites, two sites in Kern County, eight sites in Los Angeles County, and 52 sites in San Bernardino County are ineligible for listing in the National Register. A Determination of Eligibility has not been established for three sites in Los Angeles County and 13 sites in San Bernardino County. Therefore, there are 26 sites in Kern County, 137 sites in Los Angeles County, and 21 sites in San Bernardino County that were determined by the National Park Service to be eligible for listing in the National Register. (National Park Service, 2003b)

Nearly 75 percent of those sites determined to be eligible for listing are located outside of the ROI. Approximately 25 percent of those sites determined to be eligible for listing were identified as American Indian, Archaeological, or Native American sites for which location information is unavailable or restricted. As a result, it is not possible to determine whether these archaeological sites are located within or outside the ROI in the analysis presented in this document. Two eligible sites in San Bernardino County are within the ROI, Archaeological Site No. CA-SBR-1464 and Bridge No. 54C-68 are located in Barstow and Victorville, respectively. (National Park Service, 2003b)

There are 42 sites located in Kern County, 101 sites located in Los Angeles County, and 41 sites located in San Bernardino County that are designated California State Historical Landmarks. One landmark, the 20-Mule-Team Borax Terminus, Historic Landmark number 652, is located on Sierra Highway (Highway 14) in Mojave. The monument marks the Southern Pacific terminus for the 20-mule-team borax wagons that hauled borax from Death Valley to the railroad depot in Mojave from 1884 to 1889, over 165 miles of mountain and desert trail. A round trip required 20 days. Four landmarks within San Bernardino County are within the ROI including: Harvey House, Mojave Road, Camp Cady (on the Mojave Road), and Searles Lake Borax Discovery. There are no other known cultural resources in the ROI that are listed on the California Inventory of Historic Resources or California Points of Historic Interest.

The Mojave Specific Plan indicated that there are 61 cultural resources recorded within the planning area. A record search of the sacred lands files, however, did not indicate the presence of Native American cultural resources. There are no designated tribal lands located on the Mojave Airport property, although it was noted that Southern Paiute, Western Shoshone, Yokuts, and Mojave descendants are widely dispersed in the surrounding region.

In preparing the West Mojave Plan (2003), the Bureau of Land Management (BLM) contacted eight tribal governments that might attach religious and cultural significance to historic properties within the West Mojave Plan area, which includes Kern County and several other counties. The eight tribal governments were Lone Pine Paiute Shoshone, Timbisha Shoshone, San Manuel Band, Morongo Band, 29 Palms Band, Fort Mojave Tribe, Chemehuevi Tribe, and Colorado River Indian Tribes. The West Mojave Plan indicated that, as a consequence of contact, no tribe or band identified religious or cultural significance to historic properties within the planning area.

Cultural and historic surveys were recently conducted for a 65-hectare (160-acre) area in the southeastern corner of the Mojave Airport. Although no important historical materials or features were discovered within this region, investigators were able to identify, map, and collect two isolated prehistoric finds. In both cases, the immediate area near these finds was intensely examined, but no additional artifacts were discovered. The two isolated finds appear to represent limited transitory use of the area by prehistoric groups. The cultural resources inventory also included a one-mile radius records search for the eastern and northern portions of the airport. The records search revealed that no recorded cultural resources are within the project area; there are 18 recorded cultural resources within a one-mile radius; and no resources within the search area are listed on the National or California Register, California Inventory of Historic Resources, California State Landmarks, or California Points of Historical Interest. (Getchell and Atwood, Unpublished, 2003)

A records search of the sacred lands files of the Native American Heritage Commission failed to indicate the presence of Native American cultural resources in the immediate study area. However, this does not preclude the possibility that Native American resources could be discovered. Native American individuals and organizations were contacted for additional information, but no responses were received. (Getchell and Atwood, Unpublished, 2003)

The unpublished cultural survey report recommended formally recording the eastern portion of the 20-Mule Team Road[11] and an adobe homestead site as historic sites. Additionally, the report suggested that that the main body of Mojave Airport and the well and trash dumpsite located to the southeast of the drainage detention basin be designated as historical resources. (Getchell and Atwood, Unpublished, 2003) The 20-Mule Team Borax Wagon Road was determined to be eligible for listing in the National Register, however, specific location information, namely the city, was unavailable from the

[11] Only the westernmost segment of the 20-Mule Team Road is recorded as a historical site. (Unpublished study, 2003)

National Park Service. (National Park Service, 2003b) The other sites have not been proposed as eligible for listing on the National or California Register of Historic Places, or other cultural inventories.

The Voyager aircraft was designed and tested at the Mojave Airport. The Voyager was the first aircraft to fly around the world without refueling. Although the airport has no official designation commemorating this event, aircraft enthusiasts recognize the importance the site played in aviation history.

3.6 Geology and Soils

3.6.1 Definition of Resource

Geology and soils are those earth resources that may be adversely affected by a proposed action. These resources are described in terms of landforms, geology, and soil conditions as they could contribute to seismicity, erosion, and flooding. A geologic hazard is a naturally occurring or man-induced geologic condition that presents a risk or a potential danger to life and property. Such hazards could include phenomena such as landslides, flooding, ground subsistence, faulting, and earthquakes.

3.6.2 Existing Conditions

Geology

Three major rock types or geologic complexes characterize the geologic setting in the region: a basement complex of igneous rocks (rocks that have solidified from a molten state) and metamorphic rocks (rocks created when sediments undergo crystallization due to heat and pressure); an intermediate complex of continental volcanic and sedimentary rocks; and valley fill deposits. The basement complex is of pre-Tertiary age and includes quartz monzonite, granite, gneiss, schist, and other igneous and metamorphic rocks. These rocks crop out in the highlands surrounding the playa areas, which are nearly level areas at the bottom of undrained desert basins, and occur beneath the unconsolidated deposits of the playa. The intermediate complex is of Tertiary age and includes a variety of sedimentary and volcanic rock types. (Dutcher and Worts, 1963, as cited in DoD, 2002b)

Soils

The soil formations in the region are comprised of thick, unconsolidated, coarse-textured alluvial sediments composed of gravel, sand and silt of granitic composition. Alluvial sediment is sediment that is deposited by flowing water, such as in a flood plain. The U.S. Department of Agriculture (USDA) classifies the soils as belonging to Cajon-Arizo and Rosamond types. Cajon soils are described as well- to excessively-drained sands and gravelly loamy (composed of a mixture of sand, clay, silt, and organic matter) sands developed on alluvial fans and alluvial plains. Rosamond soils are very deep, nearly level to moderately sloping, well-drained soils produced on flood plains and in basins. (Kern County, 2003e)

Soil limitations include high susceptibility of the sandy surface layers to soil blowing, shallow soil depth, low available water capacity and high potential for erosion due to slope and inadequate plant cover. However, these limitations are mostly controlled by low precipitation, low ground water and hot climate. (USDA Soil Conservation Service, 1982)

Due to the great depth to ground water in the Mojave area, liquefaction does not present a major potential hazard. Liquefaction is a physical process that takes place during some earthquakes that may lead to building foundation failure. It occurs when clay-free soil deposits temporarily lose strength and behave as viscous fluids rather than solids. (Kern County, 2003e)

Mineral Resources

Mineral resources include quartz monzonite, granite, gneiss, schist, and other igneous and metamorphic rocks. (Dutcher and Worts, 1963, as cited in DoD, 2002b) Despite a rich mining history in this area, current mining activities are limited to borax mining through a surface mine in nearby Boron, California. There is also a boric acid plant on the premises. (Borax, 2003)

Seismicity

Mojave is located on the western edge of the Mojave Desert geomorphic province. The province is a large, wedge-shaped, landlocked region bounded on the southwest by the San Andreas fault and the Transverse Ranges; on the north and northeast by the Garlock fault with the associated Techachapi, El Paso, and Granite Mountains; and on the east by the Colorado River. (Kern County, 2003e) The two fault zones were very active in the Quaternary period. The San Andreas Fault zone is the more dominant of the two, with a known length of about 966 kilometers (600 miles) and right-lateral displacement of up to 564 kilometers (350 miles). The Garlock Fault zone is traceable for more than 242 kilometers (150 miles) and has left-lateral displacement. (Weston, 1986, as cited in DoD, 2002b) The area reflects characteristics typical of basin and range tensional horst and graben structure, where a part of the earth's crust between two faults is higher than the surrounding lands, which are depressed. This results from the tectonic "wrenching" of the adjacent fault system. (DoD, 2002b)

Mojave is in one of the most active and potentially dangerous seismic regions in the United States, falling within Seismic Zone 4 of the 1997 Uniform Building Code. (Kern County, 2003e)

The area of Mojave near the foothills of the eastern Tehachapi Mountains is potentially subject to earthquake-induced landslides. The land is characterized by steep slopes (15 percent or greater), unstable rock or soil characteristics, or other geologic evidence of instability. (Kern County, 2003e)

Erosion

Erosion is a natural process by which material is worn away from the earth's surface. Since the soil formations in this area are comprised of unconsolidated coarse-textured alluvial sediments, development and construction activity have the potential to result in erosion of soils.

Hydrology

The community of Mojave is subject to flash flooding. A Flood Insurance Study prepared by the Federal Emergency Management Agency (FEMA) in 1995 attributes the flooding problems in Mojave to poorly defined channels that can shift from one flood event to the next. Overflow from poorly defined channels and inadequate culverts and drains can lead to shallow flooding, even during low-intensity storms. (FEMA, 1995, see also FIRM Panels 590 and 600 of 2075, 1994) Flooding in the area is characterized primarily as sheet flow across the alluvial fans. (Kern County, 2003e) The Mojave Airport is outside the boundaries of the 100-year flood plain.

The major source of runoff in Mojave is from the Horned Toad Hills to the northwest. Alluvial fans from the base of the hills funnel runoff from the watershed area toward the community of Mojave. (Kern County, 2003e)

3.7 Hazardous Materials and Hazardous Waste Management

3.7.1 Definition of Resource

The terms hazardous material or hazardous waste include substances that, because of their quantity, concentration, or physical, chemical, or infectious characteristics, may present substantial danger to the public health, welfare, or the environment when released. Substances are formally defined as hazardous by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 USC Section 9601 et seq., as amended. Hazardous waste is further defined in 40 CFR 261.3 as any solid waste that possesses hazardous characteristics of extraction procedure toxicity, ignitability, corrosivity, or reactivity, or is listed as a hazardous waste in Subpart D of 40 CFR Part 261. Transportation of hazardous materials is regulated by the DOT as specified in 49 CFR.

3.7.2 Existing Conditions

On Site

The highest volume hazardous materials on site are the airplane fuels. There is a bulk tank farm on site with seven above ground storage tanks, and a total storage capacity of 500,000 liters (133,000 gallons). Two grades of fuel are stocked: Jet-A and 100 Low Lead. For the state fiscal year from July 2002 to June 2003, just under 7.6 million liters (just over 2 million gallons) of fuel were delivered to the airport by tank truck.

EKAD has an SPCC Plan in place that outlines operating procedures used to prevent oil spills. All above ground storage tanks are monitored daily for spills, and the inspections are formally documented. Site personnel receive formal training in fuel handling, monitoring, and emergency response. Tanks have hydrocarbon leak detection systems.

The tank farm has additional security features. A six-foot security fence, with barbed wire, surrounds the above ground storage tanks. A security camera monitors the area and the security patrol, which is at Mojave 24-7 treat the area as a priority asset. Padlocks secure tank drains.

In the event of a spill, EKAD is ready to respond quickly. Spill response kits, which include barrier pads, are located throughout the tank farm. A spill response clean-up firm is under contract and available 24 hours, 7 days a week. Emergency contacts on EKAD staff have been designated. In the past, EKAD has only had minor fuel spills and none have been of sufficient quantity to require state or federal reporting.

In addition to Jet-A and Low Lead fuel, the following hazardous materials are used and stored in a storage shed on site (EKAD, 2001)

- Unleaded gasoline
- Diesel fuel
- Acetylene
- Oxygen
- Paint
- Waste Oil
- Motor Oil
- Gear Lubricant
- Hydraulic Oil
- Tractor Hydraulic Fluid

These materials are used in operations such as aircraft maintenance.

Concept A and Concept B applicants are currently performing engine tests at Mojave. They currently use the following materials and would also use them to support launch operations

- Helium, compressed, UN1046, hazard class 2.2,
- Kerosene, UN1223, hazard class 3,
- Oxygen, compressed, UN1072, hazard class 2.2,
- Oxygen, refrigerated liquid (cryogenic liquid), UN1073, hazard class 2.2,
- Gaseous oxygen, UN1072, hazard class 2.2,
- Nitrous oxide (liquid), UN2201, hazard class 2.2,
- Nitrous oxide (gaseous), UN1070, hazard class 2.2, and
- HTPB.

These hazardous materials are currently stored in appropriate storage containers in hangars on the Mojave Airport.

Off Site

The Mojave Specific Plan did not identify any significant sources of hazardous waste or hazardous materials in the region.

The Mojave area has a detailed Community Response Plan, entitled the Mojave Desert Community Response Plan, which would be activated in the event of a threat to public health and safety. Such threats include hazardous materials spills, earthquakes, aircraft incidents (from Edwards AFB or Mojave) and other natural disasters or manmade threats. The plan was developed in November 2000 by the Kern County Office of Emergency Services, in cooperation with state and local agencies and departments, to augment the Kern County Emergency Plan. The plan describes procedures for emergency, evacuation, shelter, health, and medical operations.

The roles and responsibilities of 26 agencies involved in disaster response are clearly defined and the communication plan for release of information to the public via radio and other media is also outlined. The Community Response Plan clearly defines the roles and responsibilities of disaster responders, such as the American Red Cross, California Highway Patrol, Kern County Fire Department, local medical facilities and school districts, and Waste Management Department. The Mojave Desert Area is divided into four subareas – the Greater Mojave Area, the Greater Rosamand Area, the Boron/North Edwards Area, and the Greater California City Area. For each area, locations are specified for command posts, staging areas, and disaster service centers. Overall, the plan outlines a community approach that ensures coordinated efforts for addressing emergencies.

The following sites are listed on the Department of Toxic Substances Control's Hazardous Waste Substances Site List (Cortese List) for Mojave, California

- Products Research and Chemical Corporation,
- Commodity Refining Exchange,
- United Metal Recovery,
- Purdy Company.
- Silver Queen Junkyard, and
- Mobile Smelting. (California Department of Toxic Substances Control, 2003)

3.8 Land Use

3.8.1 Definition of Resource

Land is a highly valued resource. Communities strive to implement effective land planning policies to balance environmental, safety, and economical concerns and at the same time prepare for future growth. (Kern County, 1982) Local planning departments designate land uses for specific areas, which describe the permitted development activities that are acceptable for the area (e.g., residential, commercial, industrial, etc.), which are adopted by Kern County Board of Supervisors. (Kern County, 1982)

Three major plans control the land use development of the Mojave community

- County of Kern General Plan. The General Plan sets up a framework for identifying community goals and for maintaining current and future land use integrity. The General Plan is also a vehicle for public involvement into land planning decisions. (Kern County, 1982)

- County of Kern Airport Land Use Compatibility Plan (ALUCP). The ALUCP was developed to establish procedures and criteria for Kern County and the incorporated cities to address compatibility issues when making planning decisions regarding airports and the land uses around them. (Kern County, 2003c)

- Mojave Specific Plan. The Mojave Specific Plan provides a detailed description of how to implement the goals, objectives, and policies of the General Plan in a manner appropriate to the smaller unincorporated area of the County. (Kern County, 2003b)

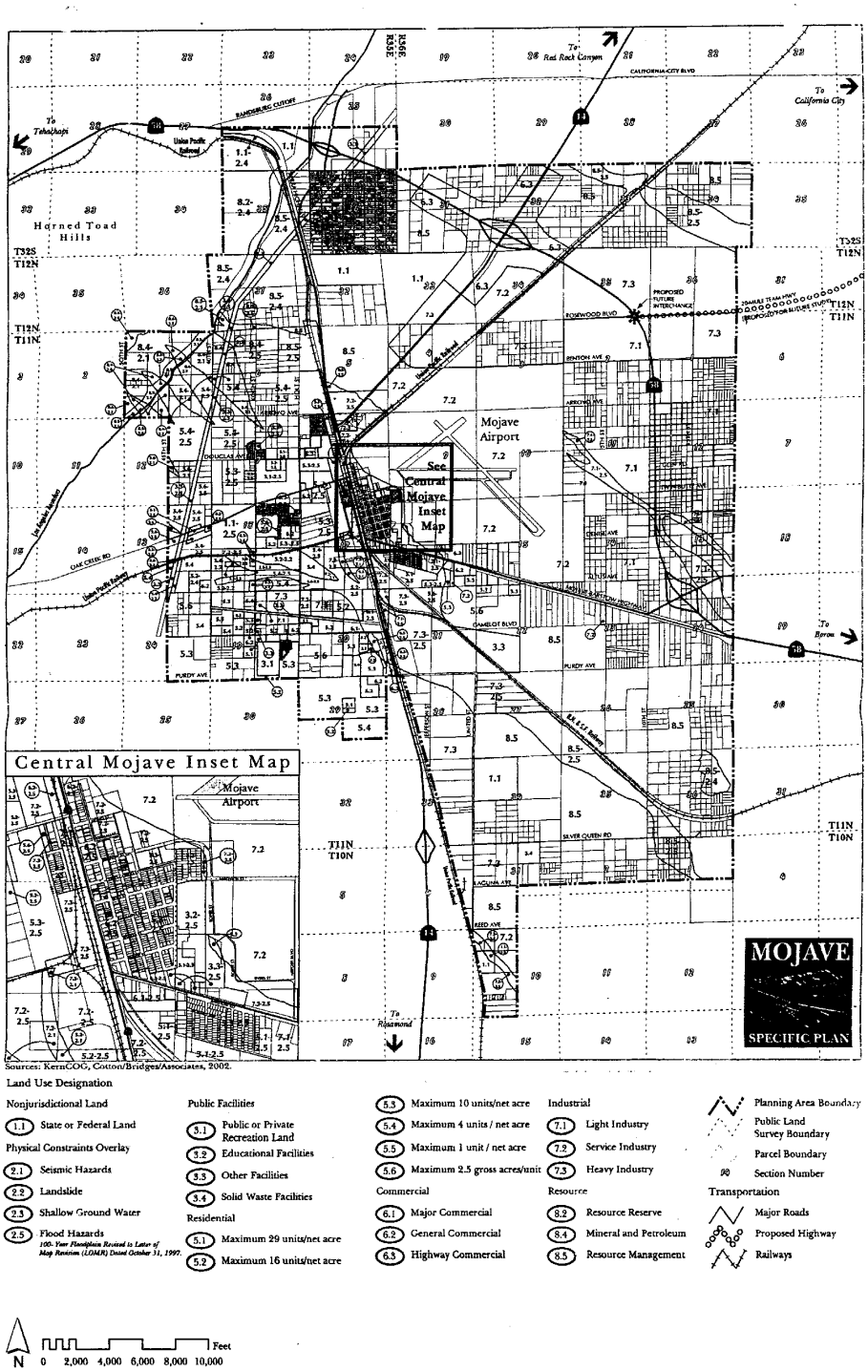
3.8.2 Existing Conditions

On Site

The Mojave Airport consists of roughly 1,214 hectares (3,000 acres) of which 80 hectares (200 acres) are developed. The Mojave Specific Plan designates the Mojave Airport as service industry land use, land use code 7.2. (Kern County, 2003a) Figure 3-9 shows the land use designation for the Mojave Airport. The permitted uses for a service industry designation include "accessory uses to an airport; industrial service uses that may include outdoor storage or use of heavy equipment." (Kern County, 2003b) In addition to the service industry land uses, the Mojave Airport is the centerpiece of the airport influence area. The ALUCP defines the airport influence area as "all properties on which the land uses could be affected by present or future aircraft operations." (Kern County, 2003c) According to Kern County Zoning Map #196, the Mojave Airport is zoned M-2 PD (Medium Industrial, Precise Development Combining). This zoning is consistent with the General Plan designation of 7.2.

Within the airport influence area, the ALUCP has established areas subject to Primary Compatibility Criteria (PCC). (Kern County, 2003c) These criteria were designed to account for the potential impacts of aircraft activity. Specifically, the criteria consider noise exposure, safety of people and property on the ground and in aircraft, airport airspace protection, and other concerns of aircraft overflight. (Kern County, 2003c) The criteria are broken down into five land use zones, A, B1, B2, C, and D. Each zone has location, safety, development, and usage specifications. (Kern County, 2003c) The PCC for the Mojave Airport are presented in Tables 3-12 and 3-13. All zone A areas are within the airport boundaries. Some portions of the zone B1 and zone C areas extend beyond the Mojave Airport property lines. All zone B2 and zone D areas are outside of the Mojave Airport property lines. (Kern County, 2003c) Figure 3-10 shows the locations of the criteria zones. Any proposed land uses within these areas that are inconsistent with the criteria are subject to review by the Kern County Planning Department and/or the Mojave community.

Figure 3-9. Map of Land Uses for the Mojave Community



Source: Kern County, 2003b

Table 3-12. PCC Locations and Elements

Zone	Location[1]	Impact Elements	Maximum Densities		Required Open Land[4]
			Residential[2] (du/ac)	Other Uses (people/ac)[3]	
A	Runway Protection Zone or within Building Restriction Line	• High risk • High noise levels	0	10	All Remaining
B1	Approach/Departure Zone and Adjacent to Runway	• Substantial risk - aircraft commonly below 123 meters (400 feet) above ground level (AGL) or within 305 meters (1,000 feet) of runway • Substantial noise	0.1	60	30%
B2	Extended Approach/Departure Zone	• Significant risk – aircraft commonly below 244 meters (800 feet) AGL • Significant noise	0.5	60	30%
C	Common Traffic Pattern	• Limited risk – aircraft at or below 305 meters (1,000 feet) AGL • Frequent noise intrusion	15	150	15%
D	Other Airport Environs	• Negligible risk • Potential for annoyance from overflights	No Limit	No Limit	No Requirement

[1]Zones may also apply elsewhere if an airport has atypical operational procedures or specialized aircraft activities.

[2] Residential parcels should not contain more than the indicated number of dwelling units per gross acre. Clustering of units is encouraged as a means of meeting the Required Open Land requirements.

[3] The land use should not attract more than the indicated number of people per acre at any time. This figure should include all individuals who may be on the property (e.g., employees, customers/visitors, etc.). These densities are intended as general planning guidelines to aid in determining the acceptability of proposed land uses. Special short-term events related to aviation (e.g., air shows), as well as non-aviation special events, are exempted from the maximum density criteria.

[4] Open land requirements are intended to be applied with respect to the entire zone. This is typically accomplished initially as part of the community's general plan or a specific plan.

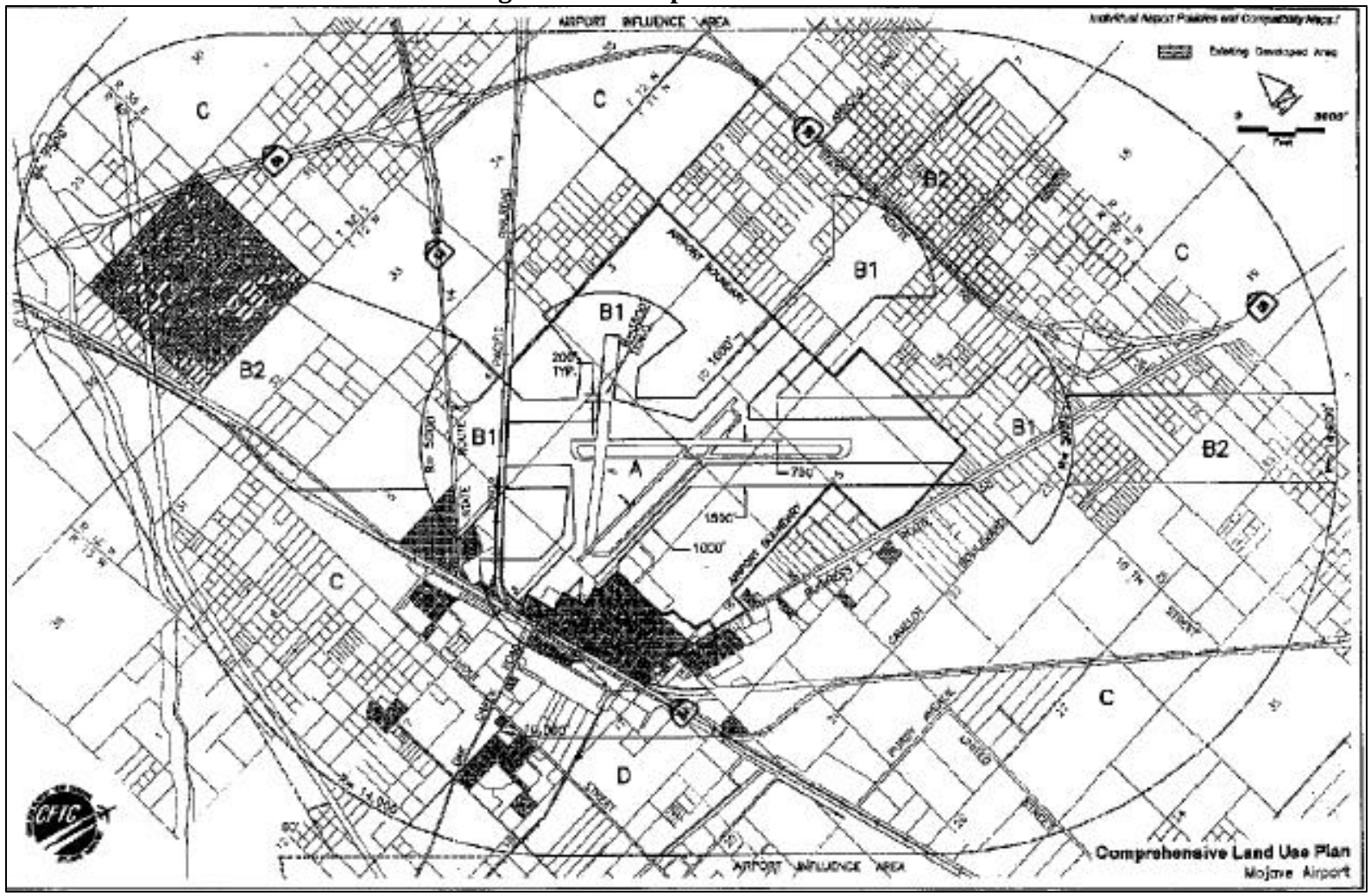
Source: Kern County, 2003c

Table 3-13. PCC Prohibitions and Uses

Zone	Additional Criteria		Examples	
	Prohibited Uses[1]	Other Development Conditions[4]	Normally Acceptable Uses[5]	Uses Not Normally Acceptable[6]
A	• All structures except ones with location set by aeronautical functions • Assemblages of people • Objects exceeding Federal Aviation Regulations (FAR) Part 77 height limits • Hazards to flight[2]	• Dedication of aviation easement	• Aircraft tie down apron • Pastures, field crops, vineyards • Automobile parking	• Heavy poles, signs, large trees, etc.
B1 and B2	• Schools, day care centers, libraries • Hospitals, nursing homes • Highly noise-sensitive uses (e.g., amphitheaters) • Storage of highly flammable materials[3] • Hazards to flight[6]	• Locate structures maximum distance from extended runway centerline • Dedication of aviation easement	• Uses in Zone A • Any agricultural uses except ones attracting bird flocks • Warehousing, truck terminals • Two-story offices • Single-family homes on an existing lot	• Residential subdivisions • Intensive retail uses • Intensive manufacturing or food processing uses • Offices with more than two stories • Hotels and motels
C	• Schools • Hospitals, nursing homes • Hazards to flight[6]	• Dedication of overflight easement for residential uses	• Uses in Zone B • Parks, playgrounds • Most retail uses duplexes and medium-density apartments • Two-story motels	• Large shopping malls • Theaters, auditoriums • Large sports stadiums • Hi-rise office buildings with more than four stories
D	• Hazards to flight[6]	• Deed notice required for residential development	• All except ones hazardous to flight	

[1] May be modified by airport-specific policies or decision of local governing body with appropriate adopted findings based upon evidence in the record.
[2] See Policy Sections 3.3
[3] Within the B1 and B2 zones, only the following flammable materials are permitted: aviation fuel, other aviation-related materials, and up to 2,000 gallons of nonaviation materials.
[4] These conditions do not apply to ministerial actions.
[5] These uses typically can be designed to meet the density requirements and other development conditions listed.
[6] These uses typically do not meet the density and other development conditions listed. They should be allowed only if a major community objective is served by their location in this zone and no feasible alternative location exists.
Source: Kern County, 2003c

Figure 3-10. Map of the PCC Zones



Source: Kern County, 2003c

Agricultural Resources

No prime farmland, unique farmland, farmland of statewide importance, or general farmland is located on the Mojave Airport.

Recreation

No recreational land uses are designated on the Mojave Airport.

Off Site

The off-site ROI, located to the east of the Mojave Airport, covers an area of about 9,886 square kilometers (3,800 square miles) and includes residential, commercial, industrial, resource management, public facilities, state and Federal and undeveloped land uses. The area consists mainly of undeveloped brush and shrub rangeland. Portions of Edwards AFB and the China Lake NAWS North and South Ranges are within the ROI. Major population centers within the ROI are presented in Table 3-14.

Table 3-14. Population Areas within the ROI

County	City	Population
Kern	Ridgecrest	24,927
	California City	8,385
	Mojave	3,836
	Boron	2,025
	North Edwards	1,227
	Randsburg	77
San Bernardino	Victorville	64,029
	Hesperia	62,582
	Barstow	21,119
	Adelanto	18,130
	Searles	1,885
	Johannesburg	176
Los Angeles[1]	-	-

[1] No significant Los Angeles County population areas in the ROI

The majority of the 12,555 hectares (31,000 acres) in the Mojave community lie within the airport influence area. A map of the Mojave community is shown in Figure 3-8. Approximately 9,599 hectares (23,700 acres) were designated as undeveloped or resource management uses in 2001. The developed areas lie primarily to the west and southwest of the airport and are a mix of residential, commercial, industrial, and public facilities land uses. The 2000 U.S. Census estimated the population of the persons living in the area covered by the Mojave Specific Plan at 3,323.

As described above, portions of the PCC zones B1, B2, C, and D lie outside of the airport property lines but within the airport influence area.

Agricultural Resources

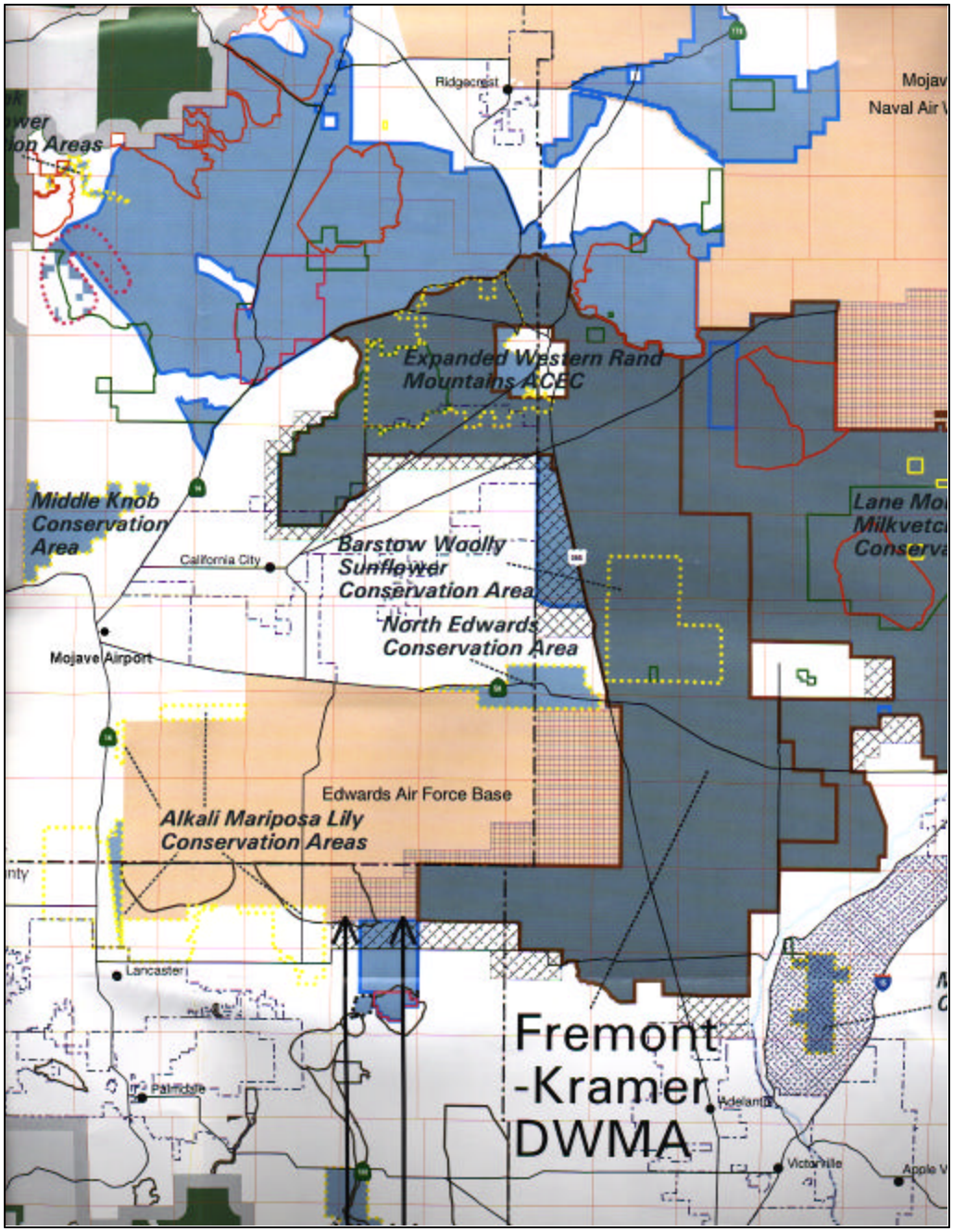
Agricultural resources in the ROI can be classified as farmlands (e.g., cropland and pastureland) and grazing land. Because of low precipitation, very limited ground water supplies, and high temperatures the off-site ROI has few farmland areas. (USDA, 1982) The Mojave Specific Plan categorizes agricultural areas as resource management areas. (Kern County, 2003b) Approximately 3,239 hectares (8,098 acres) of resource management land uses are in the Mojave community. The majority of the resource management areas are located in the northern most and southern most areas of the Mojave community. (Kern County, 2003b) Few agricultural areas are located outside of the Mojave community. (California, 2003) These areas are typically small and are not considered prime farmland, unique farmland, or farmland of statewide importance.

Grazing land allotments for cattle, sheep, and horses cover a large portion of the off-site ROI. The total grazing land within the ROI is approximately 850,000 hectares (2,125,000 acres). The allotments are classified as ephemeral, perennial, or ephemeral/perennial based on the type of forage available on the land. (Kern County, 2003a)

Recreation

The BLM administers 1,305,550 hectares (3,263,874 acres) in the West Mojave planning area. The ROI lies almost entirely within the West Mojave planning area. In 1980, California adopted the California Desert Conservation Area Plan (CDCA). In the CDCA, Congress directed the BLM to develop a plan for multiple-use management of the BLM lands that considers environmental quality, recreational uses, rights of way, and mineral development. Major BLM recreation lands in the ROI include the Pacific Crest National Scenic Trail, the Desert Tortoise Natural Area and Watchable Wildlife Area, the Jawbone Off-Highway Motor Vehicle (OHV) Area, the Dove Springs OHV Area, the Spangler OHV Area, the Rademacher Hills Trail System, and the Trona Pinnacles National Landmark. (Bureau of Land Management, 2003) Conservation areas in the ROI include portions of the Alkali Mariposa Lily Conservation Areas, the Expanded Western Rand Mountains Area of Critical Environmental Concern (ACEC), the Barstow Woolly Sunflower Conservation Area, the North Edwards Conservation Area, Fremont-Kramer Desert Wildlife Management Area, Ord-Rodman Desert Wildlife Management Area, Bendire's Thrasher Conservation Areas, Mojave Ground Squirrel Conservation Areas, Lane Mountain Milkvetch Conservation Area, Mohave Monkeyflower Conservation Area, and several other small ACECs. (Kern County, 2003a) Figure 3-11 shows the conservation areas in the off-site ROI.

Figure 3-11. Map of the Conservation Areas within the ROI



Source: Kern County, 2003a

3.9 Noise

3.9.1 Definition of Resource

The FAA defines noise as unwanted sound that disrupts everyday activities such as communication and hearing and is generally considered annoying. (FAA, 2003a) Noise is measured in amplitude, frequency, and duration. (Kern County, 2003d) Noise amplitude, or intensity, is described in units of decibels (dB) with different noises having different frequencies. (Kern County, 2003d) Other relevant measures of noise are:

A-weighted decibels (dBA). Most measures of noise for community planning purposes use dBA units, which emphasize noises in the middle range frequencies. The emphasis is placed on the middle range frequencies because some noise occurs in frequencies too high or too low for the human ear to fully perceive. (Kern County, 2003d)

Community noise equivalent level (CNEL). The CNEL describes the average sound level during a 24-hour day in dBA. For noises occurring between 7 pm and 10 pm, five dBA are added to the measured noise level, and for noises occurring between 10 pm and 7 am, 10 dBA are added to the measured noise level. (Kern County, 2003d)

Day/night average sound level (L_{dn}). L_{dn} is the average sound level during a 24-hour day. For noises occurring between 10 pm and 7 am, 10 dBA are added to the measured noise level. (Kern County, 2003d)

L_{max} is the maximum noise level in a noise event. (Kern County, 2003d)

The State of California has established standards to regulate noise exposure in a number of areas including motor vehicles and motorboats, airports, freeways, and acoustical insulation. The standards regarding acoustical insulation (California Administrative Code Title 25, Chapter 1, Subchapter 1, Article 4) are applicable to the ROI. (Kern County, 2003e) The standard requires areas exposed to noise levels of 60 dB CNEL or greater to achieve an annual interior noise level of 45 dB CNEL through acoustical insulation measures. In addition, state guidelines regulate noise exposure for land uses, and are measured as CNELs. For example, sensitive land uses require a CNEL of 65 dB for exterior areas and 45 dB for interior areas. (Kern County, 2003e) Sensitive land uses include residential and school areas. (Kern County, 2003e)

The Kern County General Plan Noise Element, the Mojave Specific Plan, and the ALUCP are used to determine the allowable noise level standards for land uses in the Mojave community. The standards for transportation noise sources are 65 dB L_{dn} for exterior noise levels and 45 dB L_{dn} for interior noise levels for areas with sensitive land uses. (Kern County, 2003e) Table 3-15 shows a comparison of noise levels with common activities or events. For non-transportation noise sources, the allowable noise level is based on the distribution of noise over time. Higher intensity noises are allowed for shorter periods of time, and stricter standards are placed on nighttime noise because of increased community sensitivity. (Kern County, 2003c)

Table 3-15. Comparison of Noise Levels with Common Noise Sources

dBA	Overall Level	Outdoor Noise Level	Indoor Noise Level
120	Uncomfortably Loud	Military jet aircraft takeoff from aircraft carrier at 15 meters (50 feet)	Oxygen torch
110	Very Loud	Turbo fan aircraft at takeoff at 61 meters (200 feet)	Rock band
100		Boeing 707 or DC-8 aircraft at one nautical mile, Jet flyover at 305 meters (1,000 feet), Bell J-2A helicopter at 30 meters (100 feet)	
90	Moderately Loud	Boeing 737 or DC-9 aircraft at 2 kilometers (one nautical mile), power lawnmower, Motorcycle at 8 meters (25 feet)	Newspaper press
80		Propeller plane flyover at 305 meters (1,000 feet), Diesel truck at 64 kilometers per hour (40 miles per hour) at (15 meters) 50 feet	Blender, Garbage disposal
70		High urban ambient sound, Passenger car 105 kilometers per hour (65 miles per hour) at (8 meters) 25 feet (77 dB)	Radio, TV, vacuum cleaner
60	Quiet	Air conditioning unit at 30 meters (100 feet)	Dishwasher at 3 meters (10 feet), Conversation
50		Large transformers at 30 meters (100 feet)	Dishwasher in next room
40	Just audible	Lowest levels of urban ambient sound	Small theater Large conference room
10			Broadcast and recording studio
0	Threshold of Hearing		

Source: DOT, 2002 and Modified from M.C. Branch, et al. 1970. Outdoor Noise and the Metropolitan Environment. Los Angeles, California, Department of City Planning, City of Los Angeles

3.9.2 Existing Conditions

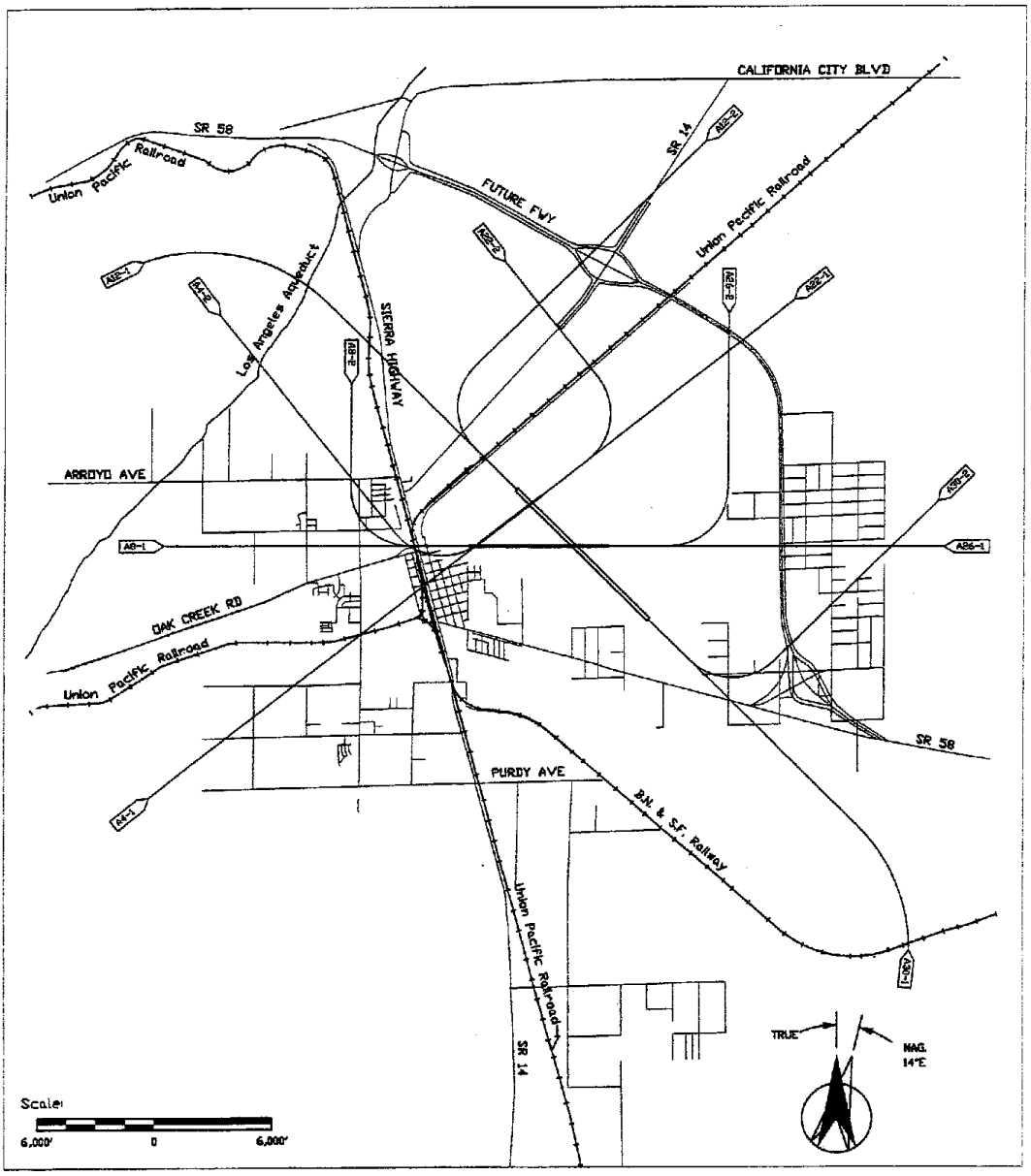
On Site

Descriptions of existing noise conditions detailed in this section rely heavily on the County of Kern Mojave Specific Plan, the Draft EIR for the Mojave Specific Plan, and the Environmental Noise Assessment (ENA) and Noise Exposure Maps prepared for the EKAD. These documents are incorporated by reference in this EA and therefore the information will only be summarized in this document.

The Mojave Airport currently operates facilities that serve general aviation activities, test pilot training, and research and development of military and non-military jet aircraft and rocket engines. (Mojave Airport, 2003a) The Mojave Airport is adjacent to the Mojave community and has been in operation since 1935. The Mojave Airport is near the junction of two major trucking routes, State Route (SR) 58 and SR 14, and two railways, the Union Pacific Railroad and the Burlington Northern and Santa Fe Railway. (Kern County, 2003d)

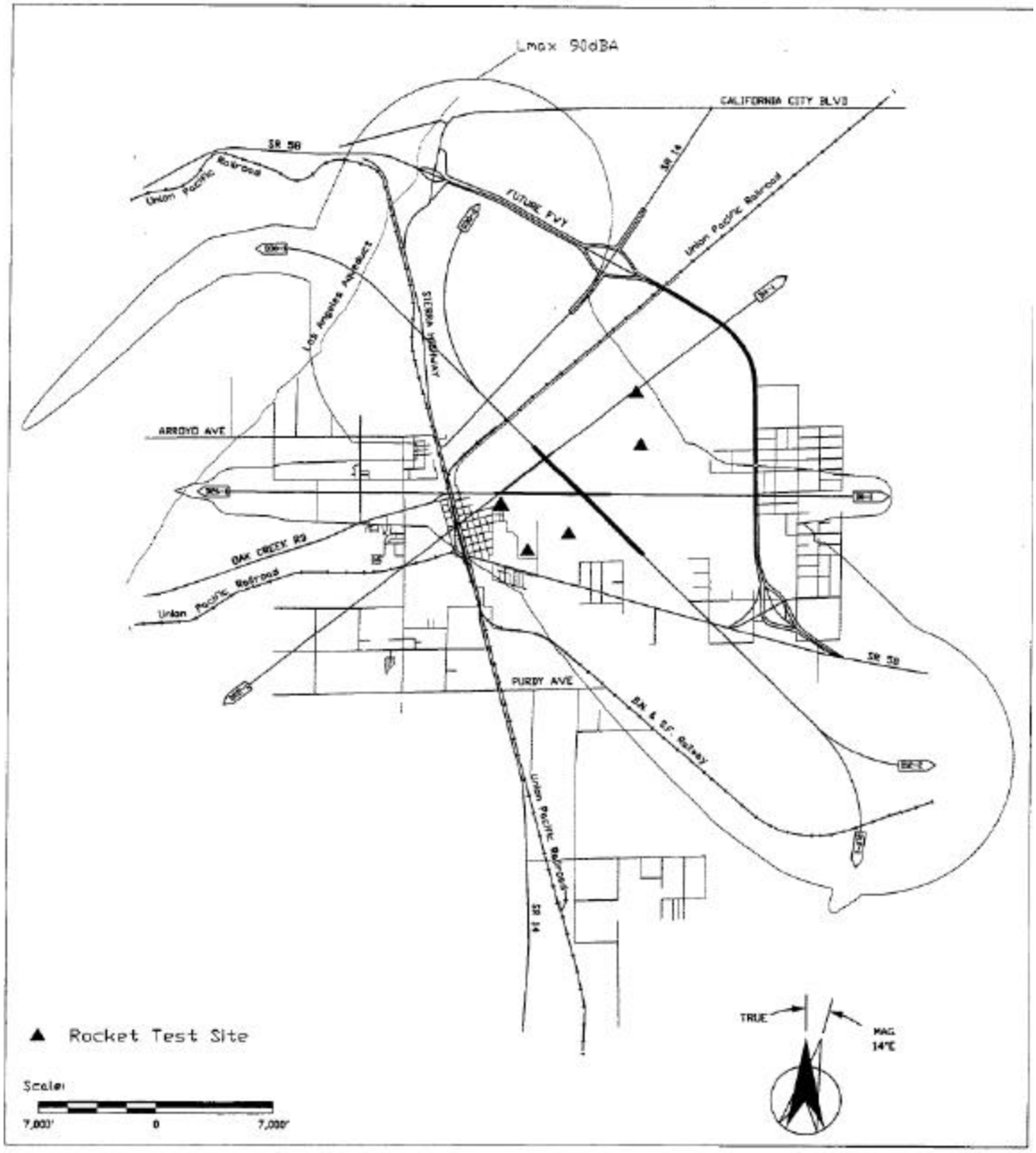
The major source of noise at the Mojave Airport is aircraft activities. (Kern County, 2003d) Aircraft noise exposure occurs mainly in the vicinity of the runways and taxi areas. The Mojave Airport has three runways, Runway 12-30, Runway 8-26, and Runway 4-22. Runway 12-30 serves large air carrier aircraft and high performance military and non-military jet aircraft. Runway 8-26 serves general aviation and propeller aircraft, but can accommodate larger aircraft depending on the wind conditions. Runway 4-22 serves smaller propeller aircraft and helicopters. (Mojave Airport, 2003a) The Mojave Airport runways and arrival and departure routes are shown in Figures 3-12 and 3-13.

Figure 3-12. Map of General Aircraft Arrival Flight Patterns



Source: Kern County, 2003d

Figure 3-13. Map of General Aircraft Departure Flight Patterns



Source: Kern County, 2003d

3.10 Socioeconomics and Environmental Justice

3.10.1 Definition of Resource

Socioeconomics is defined as the basic attributes and resources associated with the human environment, in particular population and economic activity. Socioeconomic resources consist of several primary elements including population, employment, and income. Other socioeconomic aspects that are often described may include housing and an overview of the local economy.

Examination of minority and low-income populations is warranted through the adoption of a 1994 directive commonly known as Environmental Justice, which is designed specifically to examine impacts to such things as human health of minority populations, low-income populations, and Indian tribes. Executive Order 12898 (Environmental Justice, CFR 7629 [1994]) requires each Federal agency to achieve environmental justice by addressing "disproportionately high and adverse human health and environmental effects on minority and low-income populations." The demographics of the affected area should be examined to determine whether minority populations, low-income populations, or Indian tribes are present in the area impacted by the proposed action. If so, a determination must be made whether the implementation/development of the proposed project may cause disproportionately high and adverse human health or environmental effects on the minority populations or low-income populations present.

The CEQ defined "minority" to consist of the following groups: Black/African American, Asian, Native Hawaiian or Other Pacific Islander, American Indian or Alaska Native, and Hispanic populations (regardless of race). The Interagency Federal Working Group on Environmental Justice guidance states that a "minority population" may be present in an area if the minority population percentage in the area of interest is "meaningfully greater" than the minority population in the general population.

The CEQ defined "low income populations" as those identified with annual statistical poverty thresholds from the Bureau of the Census. The accepted rationale in determining what constitutes a low-income population is similar to minority populations, in that when the low-income population percentage within the area of interest is "meaningfully greater" than the low-income population in the general population, the community in question is considered to be low-income.

3.10.2 Existing Conditions

Information was obtained from the U.S. Census Bureau on Kern County and the Mojave Census Designated Place (CDP) to describe socioeconomic trends and population, employment, income, and housing characteristics at the county and local levels. The Mojave Airport is located within the Mojave CDP. For comparison purposes, national data are also provided.

Population

The 2000 Census reported the populations of the Mojave CDP and Kern County to be 3,836 persons and 661,645 persons, respectively. Kern County grew nearly 22 percent between 1990 and 2000; however, the Mojave CDP increased at less than one-tenth the rate observed throughout the rest of County, only two percent between 1990 and 2000. Population growth trends differ significantly at the County level versus the local community level.

Table 3-16 provides information on the races of individuals in Kern County, the Mojave CDP, and the United States. The percentages total more than 100 percent because individuals may report being of more than one race. Also, the 2000 Census reported data for the Hispanic and Latino race separately from the other races.

Table 3-16. Races of Individuals

Race	Kern County (percent)	Mojave CDP (percent)	United States (percent)
White	61.6	67.5	75.1
Black or African American	6.0	5.6	12.3
American Indian or Alaska Native	1.5	1.3	0.9
Asian	3.4	2.0	3.6
Native Hawaiian and Other Pacific Islander	0.1	0.1	0.1
Some other race	23.2	18.1	5.5
Hispanic or Latino	38.4	28.3	12.5
Not Hispanic or Latino	61.6	71.7	87.5

Source: U.S. Census Bureau, 2000

As discussed previously, a "minority population" may be present in an area if the minority population percentage in the area of interest is "meaningfully greater" than the minority population in the general population. Based on the information in Table 3-16, American Indian or Alaska Native groups and Hispanic or Latino groups may be considered minority populations in Kern County and the Mojave CDP.

Employment

According to the 2000 Census, 55.7 percent of individuals 16 years and older (1,396 of 2,507 total persons) were in the labor force in the Mojave CDP, compared with 56.6 percent in Kern County. The 2000 Census reported that unemployment rates in Mojave and Kern County were 8.2 percent and 6.7 percent, respectively. In Mojave, the top industries were education, health, and social services; art, entertainment, recreation, accommodation, and food services; manufacturing; and transportation, warehousing, and utilities. In Kern County, the top industries were education, health and social services; agriculture, forestry, fishing, hunting, and mining; retail trade; and public administration. As of July 8, 2003, 950 individuals were employed by businesses at the Mojave Airport.

Income

In 1999, the median household income for the Mojave CDP and Kern County was $24,761 and $35,446, respectively. The national median household income was $41,994.

Both the Mojave CDP and Kern County are characterized as low-income areas. As discussed previously, when the low-income population percentage within the area of interest is "meaningfully greater" than the low-income population in the general population, the area of interest is considered to be low-income. Differences in poverty levels occur at the county level versus the local level, i.e., the poverty status of the Mojave CDP is significantly greater than that of Kern County. Table 3-17 summarizes the percentage of families and individuals below the poverty level in 1999 in Kern County, the Mojave CDP, and the United States.

Table 3-17. Poverty Status in 1999

Group	Kern County (percent)	Mojave CDP (percent)	United States (percent)
Families	16.8	31.7	9.2
Individuals	20.8	36.2	12.4

Source: U.S. Census Bureau, 2000

Housing

Over the last 10 years, housing growth in Mojave has grown at about the same rate as that observed throughout Kern County. Between 1990 and 2000, housing units increased approximately 18 percent in the Mojave CDP and approximately 17 percent in Kern County.

The 2000 Census reported that the Mojave CDP has 1,806 housing units, of which 22.0 percent are vacant. Kern County has 231,564 housing units, of which only 9.9 percent are vacant. Housing vacancy is a significant issue in the Mojave CDP. Slow population growth in Mojave between 1990 and 2000 (two percent) contributed to the high vacancy rate. In Mojave, housing tenure within the 1,408 occupied housing units is similar between owners (51.8 percent) and renters (48.2 percent). In Kern County, housing tenure for owners and renters is 62.1 percent and 37.9 percent, respectively. The Mojave Specific Plan noted that more than half of housing units in the Mojave area are over 30 years old.

In 2000, the median home value within the Mojave CDP was $56,500, and the median rent was $409 per month. The Mojave Specific Plan indicated that affordable housing costs are defined as 80 percent of the Kern County median home price, which was $93,300 in 2000. As a result, home prices at or below $74,640 would have been considered affordable in Mojave in 2000.

Infrastructure

Kern County maintains 3,280 miles of highways, of which 2,200 miles have a centerline stripe, approximately 50,000 signs or delineators, and 80 traffic signals. The Kern County Roads Department oversees road construction, design, and maintenance; issuance of permits; and regional transportation. The Road Department, in conjunction with the Kern Council of Governments, is responsible for growth and transportation planning issues, rural public transportation planning, and development review.

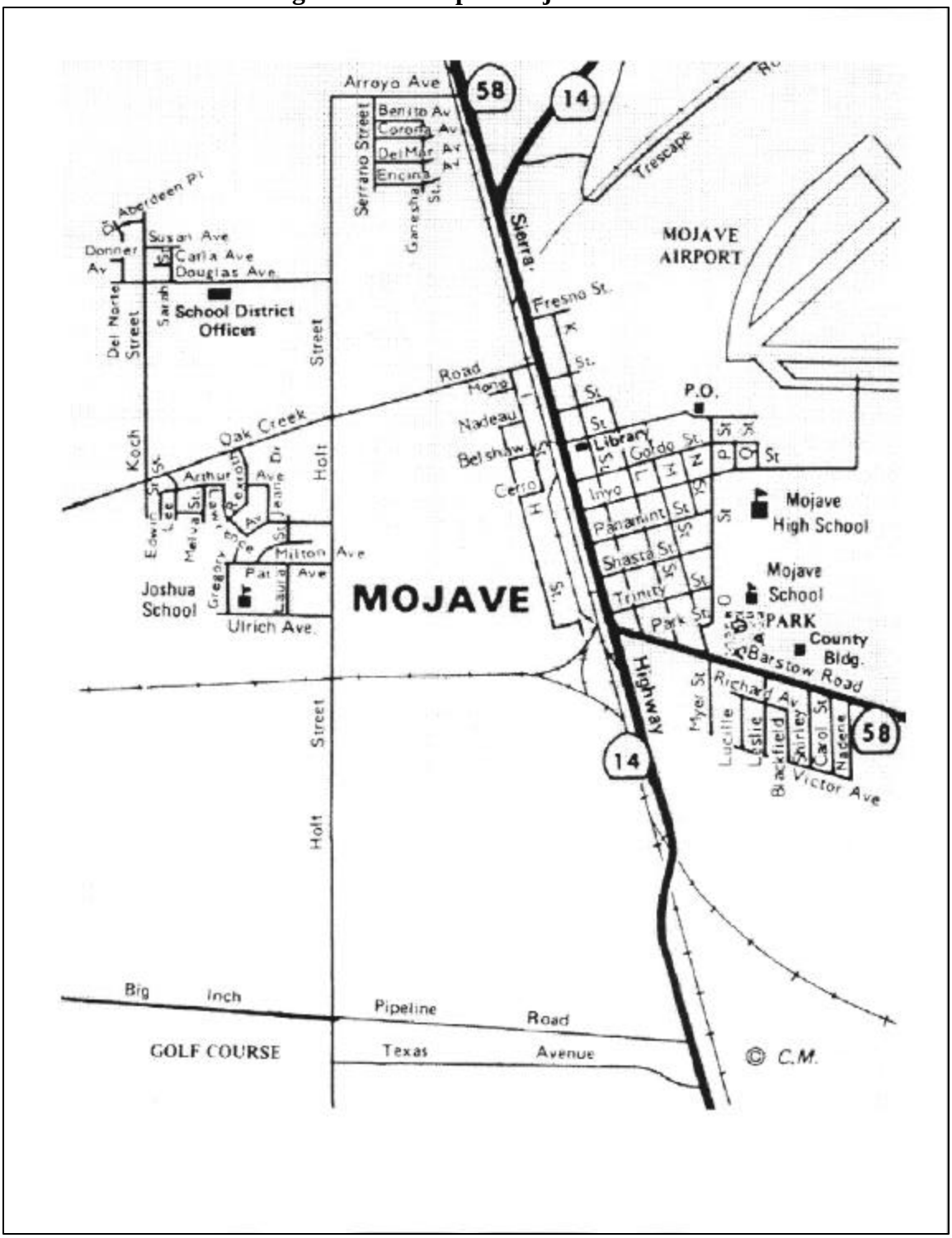
The General Services Division of the Kern County Administration Office is responsible for supervision and control over acquisition and utilization of all telecommunications resources and facilities in the Kern County government. Two-way radio and microwave communication plays a major role in county government telecommunications. The largest radio systems serve the Sheriff, Fire, Emergency Medical Services, and Administration. Kern County's communications system is monitored, controlled, and supervised 24-hours per day without operational dependence upon any common carrier.

Other Services

The Emergency Medical Services Department (EMS) is the lead agency for the emergency medical services system in Kern County. There are 12 hospitals and five ambulance providers located in Kern County. The Tehachapi Hospital is located in Tehachapi. The Kern County's Sheriff's Department is headquartered in Bakersfield; however, the East Area Substation Division includes a location in the community of Mojave.

There are 48 school districts in Kern County. The Mojave Unified School District includes three elementary schools, two middle schools, and two high schools. The schools nearest the airport are the Mojave Elementary School and Mojave High School, both of which are located approximately 1.4 kilometers (0.9 miles) away. In addition, Kern County has 28 public libraries, including the Mojave Branch Library, which is located approximately 3.4 kilometers (2.1 miles) from the airport. The community of Mojave has two parks, Mojave East Park and Mojave West Park. Mojave West Park is 2.12 hectares (5.25 acres) and located at Douglas Avenue, but not used often by the public due to limited development in the surrounding area. Mojave East Park is 3.1 hectares (7.6-acres) and located near the airport at Highway 58 and M Street. This facility is heavily used by both community residents and visitors and consists of a recreation building, baseball field, handball courts, basketball court, and play equipment. Figure 3-14 shows the Mojave Airport in relation to area schools, the library, and Mojave East Park.

Figure 3-14. Map of Mojave Schools



3.11 Transportation

3.11.1 Definition of Resource

Transportation refers the capacity to move vehicles, people, and goods through the area of interest. Included in the affected environment are the road network, railway lines, and public transportation, including transit buses and commercial air service.

3.11.2 Existing Conditions

This section details the existing road and rail networks in the Greater Mojave area.

Two State highways serve the area. SR-14, referred to as the Sierra Highway, runs roughly north south. Traveling south on SR-14, one accesses the Antelope and Santa Clarita Valleys and Los Angeles County. To the north is the Ridgecrest Area. The second highway, SR-58, the Mojave-Barstow Highway, runs roughly east west. Tehachapi and Bakersfield are to the west; Barstow is to the east.

In downtown Mojave, the two highways currently share the same alignment for a distance of approximately three kilometers (two miles). The airport is accessed from an off ramp of SR-58, located approximately 1.6 kilometers (one mile) west of the end of the shared alignment. The exit is for Airport Boulevard. The airport property is close to the SR-58 exit, and the majority of facilities are located approximately one mile from the highway.

The realignment of SR-58, which was recently completed, is 14 kilometers (nine miles) long and is located east and north of the Mojave Airport. The former SR-58 was redesignated Business SR-58, and is located south and west of the airport. Airport access continues to be the Airport Boulevard exit from the redesignated Business SR-58.

According to the Mojave Specific Plan, the traffic flow within the greater Mojave area is generally good. In the report, existing conditions were analyzed using a level of service (LOS) rating to describe the amount of congestion in intersections. LOS is ranked from a high of LOS A, representing no limitation on movement, to a low of LOS F, representing high levels of congestion. Definitions of LOS designations for arterial roadways are found in Table 3-18. Intersections in Mojave currently ranked LOS C and LOS D during peak-hours, thus meeting or exceeding the County standard of LOS D. However, the Plan projects increased traffic and a decreased LOS in future years. Specifically, the levels of service along portions of the Sierra Highway are projected to be LOS E and LOS F during peak traffic hours.

Table 3-18. Definitions of LOS Flow Conditions

Level of Service	Flow Conditions	Volume to Capacity Ratio
A	Free flow operations	0 - 0.60
B	Reasonably unimpeded operations at average travel speeds	0.61 - 0.70
C	Stable operations with more restricted ability to maneuver and change lanes	0.71 - 0.80
D	Small increases in flow may cause substantial increase in delay and decrease in speed	0.81 - 0.90
E	Significant delays	0.91 – 1.00
F	Extremely low speeds	> 1.00

Two railroad lines are in the vicinity of the Mojave Airport: the Union Pacific Railroad and the Burlington Northern and Santa Fe Railway. There is a railroad spur onto the airport property.

Kern County has a regional fixed-route bus line with service from Mojave to Bakersfield, Tehachapi, California City, Rosamond, Lancaster, and Palmdale. Dial-a-ride services are also available. The closest airports with scheduled passenger service are Bakersfield and Inyokern.

3.12 Visual and Aesthetic Resources

3.12.1 Definition of Resource

Visual resources are defined as the natural and man-made features that constitute the aesthetic qualities of an area. Landforms, surface water, vegetation and man-made features are the fundamental characteristics of an area that define the visual environment and form the overall impression than an observer receives of an area.

The importance of visual resources and any changes in the visual character of an area are influenced by social considerations, including the public value placed on the area, public awareness of the area, and community concern for the visual resources in the area.

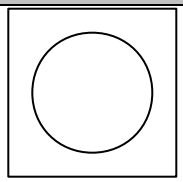
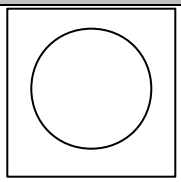
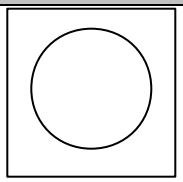
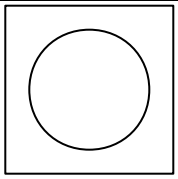
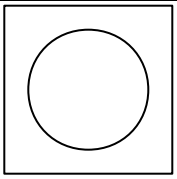
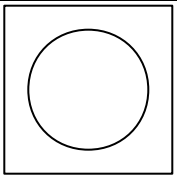
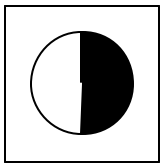
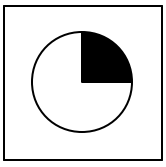
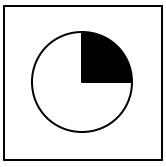
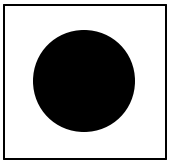
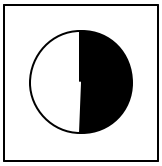
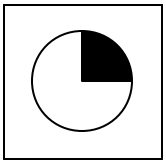
The visual resources of an area and any proposed changes to these resources could be evaluated in terms of "visual dominance" and "visual sensitivity." Visual dominance describes the level of noticeability that occurs as the result of a visual change in an area. Visual sensitivity depends on the setting of an area. Figure 3-18 graphically displays the concepts of visual dominance and visual sensitivity.

Visual Dominance. Proposed changes in the character of an area can be defined in terms of visual dominance. For example, if the users of the area would overlook the changes to the area's setting, then the changes would be "*not noticeable.*" If the changes would be noticeable but would be dominated by other features in the area's setting, then the changes would be "*visually subordinate.*" A change that would compete with the visual

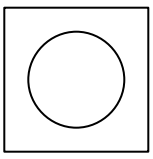
character of an area is "*visually co-dominant.*" Finally, a change that would detract from the character of the setting and would demand attention is "*visually dominant.*"

Visual Sensitivity. Visual sensitivity depends on the particular setting in which the proposed action is to occur. Areas such as coastlines, national parks, recreation areas, and wilderness areas are areas of high visual sensitivity. In these areas, viewers tend to be aware of even very small changes in the visual environment. On the other hand, in areas of low visual sensitivity such as industrialized areas, major changes can occur without undue notice to observers.

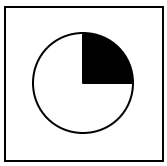
Figure 3-15. Visual Dominance and Sensitivity

Intensity Visual Dominance	**Context Visual Sensitivity**		
	High	**Moderate**	**Low**
Would generally be overlooked **"Not Noticeable"**			
Noticeable, but not detract from the existing dominant landscape features **"Visually Subordinate"**			
Changes compete for attention with other view shed features **"Visually Co-dominant"**			
Changes demand attention **"Visually Dominant"**			

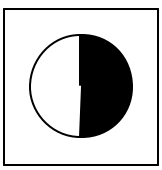
Impact



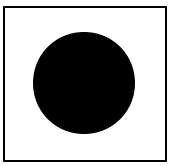
Not Significant



Adverse, but not significant



Significant, but mitigable



Significant and unavoidable

3.12.2 Existing Conditions

Aesthetics

The existing conditions at the Mojave Airport would be characterized as low visual sensitivity since the site is currently an industrialized area. The existing operations at the airport consist of industrial uses that have been in place since 1935. The airport currently services approximately 300 planes per day, from its three paved runways. At all times, many airplanes are parked at the airport, and they can be seen from SR-58 and SR-14, the two highways that intersect in the community of Mojave. Two rail lines also intersect in Mojave.

On the airport grounds, there are over 1,214 hectares (3,000 acres) of undeveloped land available for industrial and aviation development. (Mojave Airport, 2003a) Figure 3-16 shows an aerial view of the Mojave airport. As of 2001, of the nearly 12,555 hectares (31,000 acres) within the planning area of the Mojave Specific Plan, approximately 9,599 hectares (23,700 acres) were either vacant, undeveloped land or classified as resources uses (which signifies primarily desert land uses). (Kern County, 2003e) Therefore, much of the area around the Mojave Airport does not have existing structures or other obvious man-made uses that would impact visual resources.

Current light sources at the airport include security lighting on the grounds and safety lighting on the runways, which are on overnight.

In the mountains adjacent to the Mojave Airport, there is a large wind farm. The windmills, used to harvest energy, have altered the visual aesthetics of the area adjacent to the airport. Figure 3-17 shows the Mojave Wind farm.

Figure 3-16. Aerial View of Mojave Airport

Figure 3-17. Mojave Wind Farm

Source: Windland Inc, 2003

3.13 Water Resources

3.13.1 Definition of Resource

Water is considered to be the most important natural resource. (EPA, 2002) It is vital not only for human existence, but also for wildlife, agricultural, industrial, and recreational activities. An average family uses 985 liters (260 gallons) of water per day, and the United States as a whole consumes approximately 99 billion liters (26 billion gallons) per day. (EPA, 2002) Water is supplied by ground and surface water sources. However, water of high quality is needed as well. Water resources in the United States face contamination from pathogens, nutrients, sediment, and hazardous materials. As a result, the EPA, the California State Water Control Board, and the Lahontan Regional Water Control Board have developed standards to regulate water quality and quantity to ensure that water can continue to maintain its intended uses.

This section will also discuss utility and service system infrastructure. This infrastructure refers to the system of public works (basic facilities, services and installations) required for the functioning of a county, region or organization and typically includes handling of and systems for potable (drinkable) water, wastewater (sewage and/or septic systems), solid waste, and energy (typically electrical).

3.13.2 Existing Conditions

On Site

The Mojave Desert is one of the most arid places in the United States. (Kern County, 2003a) The average annual rainfall in the area is approximately 13 centimeters (5 inches) and the average annual evaporation is 29 centimeters (11 inches). (DoD, 2002a) The Mojave Airport is in the South Lahontan Hydrologic Region. The three main surface water systems that make up this unit are the Mono Lake, the Owens River, and the Mojave River. (Kern County, 2003b) In addition, several closed ground water basins are in the South Lahontan Hydrologic Region. The Mojave Airport is located in the Antelope Valley ground water basin. The Antelope Valley basin reaches from southeast Kern County to northeast Los Angeles County. (Kern County, 2003b) Figure 3-18 shows the South Lahontan Hydrologic Region.

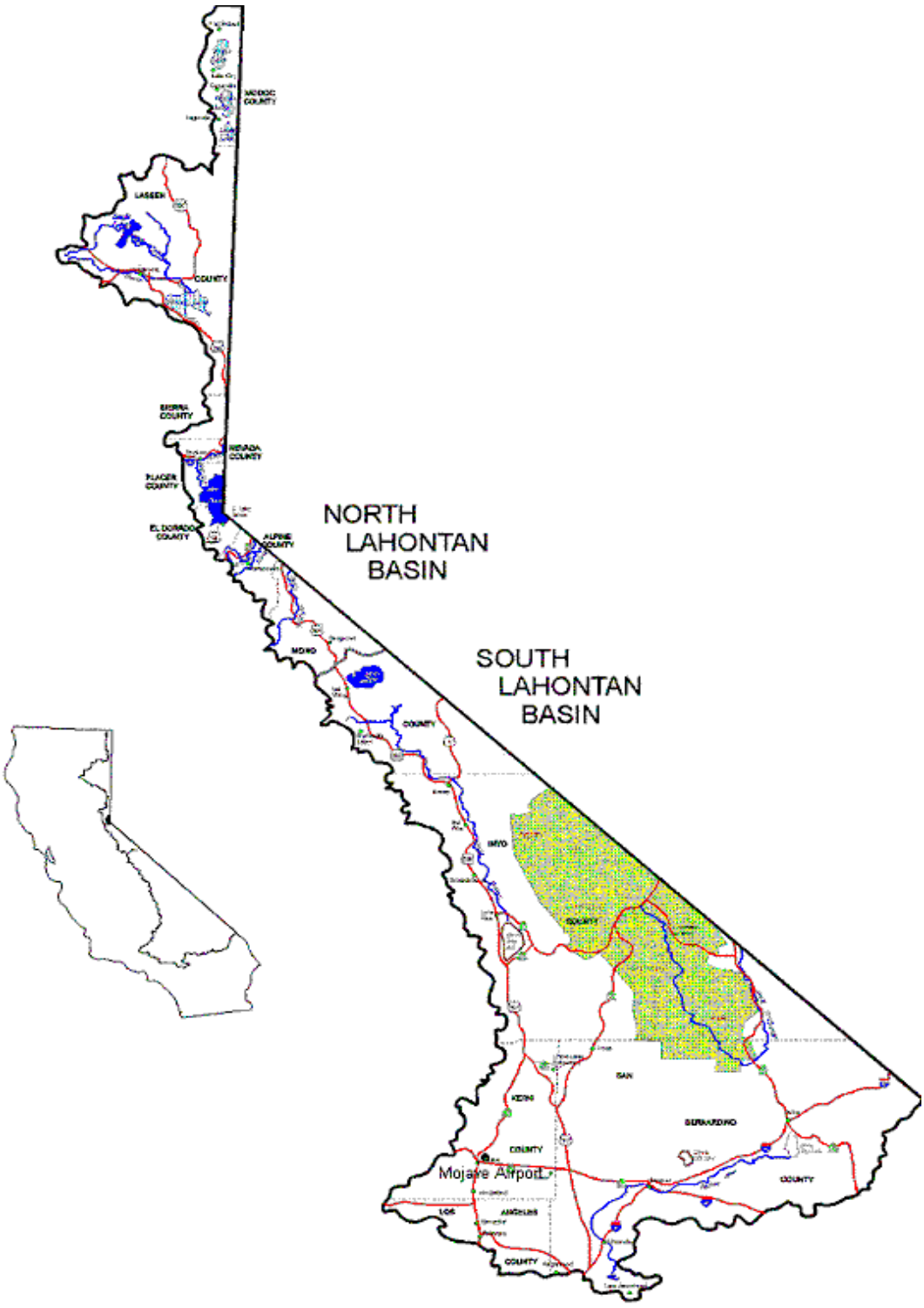
The Mojave Airport is subject to local flooding as a result of strong but short duration storms. (Kern County, 2003a) As a public transportation facility, the Mojave Airport was issued a Statewide Storm Water and Waste Discharge Requirements Permit in 1999. This permit was issued as part of the National Pollutant Discharge Elimination system (NPDES) program and is a general permit for the State of California Department of Transportation facilities and activities. The storm water permit allows the Mojave Airport to discharge waters resulting entirely from storm events. (California State Water Resourced Control Board, 1999) All other discharges of non-storm water are prohibited unless otherwise stated in the permit. The discharge "sump" is located on the south boundary of the airport. (Mojave Airport, 2003b) No surface water bodies are located on the Mojave Airport.

Off Site

The off-site ROI is located in the South Lahontan Hydrologic Region with the majority of it in the Antelope Valley basin. As discussed above, the majority of the water supply comes from ground water sources. Historically, the ground water withdrawal rates have exceeded the recharge rates. (Kern County, 2003a) As a result, water conservation is key to the continued use of the Antelope Valley basin.

The ground water supply is recharged from precipitation that falls within the basin. (Kern County, 2003a) The most important features of this recharge process are alluvial fans. (Kern County, 2003a) Alluvial fans are areas where coarse particles and sediment have been deposited and are generally located near the mountains that run along the edges of a basin. When water from snowmelt and precipitation events flows out of the mountains and over the alluvial fans, the coarse particles allow rapid infiltration into the ground water. (Kern County, 2003a) The depth to ground water in the Mojave community ranges from 15 to 91 meters (50 to 300 feet) below the surface. (Kern County, 2003b) Ground water does not discharge to major surface water bodies in this area. It is lost to evapotranspiration processes. (Kern County, 2003a)

Figure 3-18. Map of the South Lahontan Basin



Source: Department of Water Resources web site

Playas, or dry lakebeds with flat surfaces, are another important feature found throughout the ROI. (Kern County, 2003a) Storm water from surrounding areas drains into the playas. The fine sediments and alkaline salts and minerals that are characteristic of the playas prevent infiltration of the runoff. The water is temporarily held in the playa until it evaporates. (Kern County, 2003a) Large playas found in the ROI include Rogers Dry Lake, Rosamond Dry Lake, Buckhorn Dry Lake, Searles Lake, Cuddeback Lake, and Harper Dry Lake. (DoD, 2002a; BLM, 2003) Although most of Harper Lake is dry, the southwest corner of the lake receives a large amount of runoff from nearby farms. The storm water runoff has created a marsh area that covers approximately 194 hectares (480 acres) and supports a large waterfowl population. (BLM, 2003)

Surface water flows are dominated by short flow paths that are usually located near the mountain areas. (Kern County, 2003a) Typically, these surface flow systems are less than a few miles in length. The only major surface flow in the ROI is the Mojave River.

The water quality throughout the ROI varies. As a general rule, ground water found closer to the recharge source is less mineralized than that water found further away. (Kern County, 2003a) Water found at the discharge points can have high concentrations of sodium, potassium, chloride, sulfate, and tritium. Surface water flows resulting from storm events have high sediment concentrations, and water found in playas can have high concentrations of fine sediments due to wind forces. (Kern County, 2003a) Water Quality in the Mojave community is similar to that discussed in the on-site ROI.

Wild and Scenic Rivers

The following rivers are designated as wild and scenic rivers in California, American (Lower), American (North Fork), Big Sur, Eel, Feather, Kern, Kings, Kalmeth, Merced, Sespe Creek, Sisquoc, Smith, Trinity, and Tuolumne. None of the wild or scenic rivers designated by the National Park Service are in the Region of Influence for this project; therefore, impacts will not be considered in this EA.

Utility and Service System Infrastructure

The Mojave Public Utility District (MPUD) provides water supply services to the Mojave Airport. The MPUD operates seven ground water wells that supply 75 percent of the total water supply. The wells are tapped into the Chaffee and Proctor subunits of the Antelope Valley basin. (Kern County, 2003b) The Antelope Valley basin is recharged by surface runoff from the surrounding mountains. (Kern County, 2003b) The existing wells can supply approximately 800 to 900 million gallons of water per year. (Kern County, 2003b)

The other 25 percent of the water is from surface water sources and is supplied by the Antelope Valley-East Kern (AVEK) Water Agency. (Kern County, 2003b) AVEK covers a region of 5,957 square kilometers (2,300 square miles) that includes parts of Los Angeles County, Kern County, and Ventura County. (Kern County, 2003b) Generally, AVEK receives about 113,480,330 cubic meters (92,000 acre-feet) of water per year

from the State Water Project (SWP). Of that amount, AVEK distributed only 213,306 cubic meters (172.93 acre-feet) to the MPUD. (Kern County, 2003a) This is only 43 percent of what the MPUD requested. Increased water demands and insufficient distribution systems have limited the amount of surface water the SWP can provide to its many regional customers. (Kern County, 2003a) Future allotments of water to AVEK and subsequently to the MPUD are expected to remain the same or possibly decrease. In preparation for future shortages, the MPUD is developing an Urban Water Management Plan. (Kern County, 2003a) This plan will ensure a reliable water source to meet the growth of the MPUD during normal, dry, and multiple dry years. In addition, the MPUD will require any new urban development to provide evidence of service by a community water supply or the MPUD, continued monitoring of ground and surface water supplies, and development project applicants to show availability of utilities, public services, and adequate infrastructure for the project. (Kern County, 2003a)

The EPA and the California EPA have established water quality standards that public water systems must meet. The Lahontan Regional Water Quality Control Board enforces these water supply standards. Antelope Valley's major water quality concern for ground water is dissolved solids such as salts and minerals. The ground water quality in the wells that supply the MPUD is characterized as "generally suitable for domestic, irrigation, and most industrial uses." (Kern County, 2003e)

MPUD also provides wastewater collection and treatment services to the Mojave Airport. (Kern County, 2003b) The wastewater treatment system is designed to handle 2,262,000 liters per day (600,000 gallons per day), but currently only collects and processes 1,508,000 liters per day (400,000 gallons per day). (Kern County, 2003a) The wastewater collection system consists of approximately 35 kilometers (22 miles) of sewer lines and one pump station. The wastewater treatment system consists of 24 hectares (60 acres) of stabilization ponds that rely on evaporation and infiltration processes for wastewater disposal. Urban development projects within the MPUD are required to obtain a "will serve" letter from the MPUD stating that the District has the capacity to treat the wastewater generated by the development. Septic tank systems are permitted at the discretion of the Kern County Environmental Health Services Department. (Kern County, 2003b)

The California Integrated Waste Management Act and the Integrated Waste Management Plan requires counties to develop and implement Source Reduction and Recycling Elements and a countywide siting element. (Kern County, 2003a) Kern County has begun a source reduction and recycling program including the Household Hazardous Waste Disposal and the Small Business Hazardous Waste Disposal programs. Kern County also diverts approximately 50 percent of its generated solid waste from landfill disposal by source reduction, recycling, and composting. (Kern County, 2003a) The Mojave-Rosamond Sanitary Landfill, located 8 kilometers (5 miles) south of the Mojave community, is a Class III facility, which accepts only non-hazardous solid wastes. (Kern County, 2003a) The landfill receives approximately 8,618 metric tons (9,500 tons) of solid waste per year and has a remaining capacity of 335,658 metric tons (370,000 tons). (Kern County, 2003a) The estimated date of closure for the landfill is 2013.

Southern California Edison provides electricity to the Mojave Airport and the Mojave community. (Kern County, 2003a) The Mojave community uses an estimated 20 megawatts of electrical power per year. The Southern California Gas Company provides natural gas service to the Mojave community. (Kern County, 2003a) The high-pressure gas service line originates in Texas and goes through several regulator stations to convert the gas to medium pressure for residential, commercial, and industrial use. (Kern County, 2003a)

4. Safety and Health

4.1 Existing Safety and Health Conditions

The proposed actions and alternatives could have impacts on the safety and health of on-site workers at the Mojave Airport and the general public. The following sections describe the existing safety and health conditions regarding airspace and air traffic conditions, and operations at the Mojave Airport

4.1.1 Airspace and Air Traffic

The FAA is charged with the overall management of airspace and has established certain criteria and limits for the use of various sectors of airspace. Airspace management is based largely on the number of aircraft that will be operating in an area, the nature of the operations conducted in that area and the level of safety needed to handle the air traffic and the nature of the aircraft activity. Any changes in airspace use can affect the safety and health of aircraft and persons within the airspace and reduce the airspace availability to other aircraft.

The operation of vehicles associated with the proposed action and alternatives that would operate from the Mojave Airport would originate at the airport. The operational area would extend from the Mojave Airport out to a 113-kilometer (70-mile) radius between Ridgecrest to the north and Victorville to the south. This area is almost exclusively contained within the R-2508 Complex. The Mojave Airport is a general aviation airport with a control tower operating Monday through Friday (M-F), 7 am to 5 pm. The Mojave Airport control tower schedules and coordinates airport operations such as takeoffs and landings. When the control tower is in operation, the airspace classification around the Mojave Airport is Class D within a 6.9-kilometer (4.3-nautical mile) radius extending from the surface to 1,463 meters (4,300 feet) above MSL. (Maps.com, 2003) When the control tower is not in operation, the airspace around the Mojave Airport is Class E and G. (Mojave Airport, 2003a) The FAA issued a waiver to the EKAD in 2002 for the operation of aircraft at Mojave Airport for

- Speeds in excess of 463 kilometers per hour (250 knots) IAS below 3,049 meters (10,000) feet MSL, and
- Speeds in excess of 370 kilometers per hour (200 knots) IAS within Mojave Airport Class D airspace.

The R-2508 Complex, which covers approximately 51,800 square kilometers (20,000 square miles), is made up of Special Use Airspace and ATCAA. The basic structure of the R-2508 Complex airspace includes three types of airspace designated by the FAA through rulemakings or administrative procedures prescribed by the FAR. These three types of airspace include restricted areas, MOAs, and ATCAAs. There are seven restricted areas, 10 MOAs, and 12 ATCAAs in the R-2508 Complex. These airspace areas can be used individually or in various combinations to accommodate a variety of test or training missions. The R-2508 restricted airspace extended upwards from FL200, which is 6,098 meters (20,000 feet) above MSL to unlimited altitude. (DoD, 2002a) The

purpose of the R-2508 Complex airspace is to confine activities, including certain types of test or training flight or weapons uses, to locations where they can be performed effectively while ensuring the greatest practical level of safety for all civil and military airspace users. Inside the R-2508 Complex, the DoD conducts military operations and training flights that require aircraft to fly at supersonic speeds, sometimes as low as 61 meters (200 feet) above the ground. Supersonic flight is not allowed within the R-2508 Complex outside the Supersonic corridors - Black Mountain Supersonic Corridor (FL300 [9,144 meters or 30,000 feet MSL]) and above in the area outside of R-2515; (3,048 meters [10,000 feet MSL]) and above west of Highway 395, and 152 meters (500 feet) AGL East of Highway 395; and the High Altitude Supersonic Corridor (FL300 and above). (Kern County, 2003) Within the R-2508 Complex, there are internal restricted areas. These areas include R-2502N, R-2502E, R-2505, R-2506, R-2515, and R-2524. (DoD, 2002a) Only R-2505, R-2506, R-2515, and R-2524 are applicable to the proposed action and alternatives. In addition, the R-2508 Complex includes military operations areas (MOAs) and ATCAA. Table 4-1 and Figure 4-1 provide information on the R-2508 Complex and its internal units.

Table 4-1. Restricted Airspace Units within the R-2508 Complex

Restricted Area		Hours of Operation	Effective Altitude	Air Traffic Control
R-2508		6 am-10 pm M-F[1]	FL200 to Unlimited[2]	HI-DESERT TRACON
R-2502N		Continuous	Unlimited	HI-DESERT TRACON
R-2502E		Continuous	Unlimited	HI-DESERT TRACON
R-2505		Continuous	Unlimited	HI-DESERT TRACON
R-2506		Continuous	Ground level to 1,829 meters (6,000 feet) above MSL[3]	HI-DESERT TRACON
R-2515		Continuous	Unlimited	SPORT
R-2524		Continuous	Unlimited	HI-DESERT TRACON
Barstow	MOA	6 am-10 pm M-F[1]	61 meters (200 feet) AGL to FL180[4, 5]	HI-DESERT TRACON
	ATCAA		FL180 to FL600[5, 6]	
Buckhorn	MOA	6 am-10 pm M-F[1]	61 meters (200 feet) AGL to FL180[4, 5]	HI-DESERT TRACON
	ATCAA		FL180 to FL600[5, 6]	
Isabella	MOA	6 am-10 pm M-F[1]	61 meters (200 feet) AGL to FL180[4, 5]	HI-DESERT TRACON
	ATCAA		FL180 to FL600[5, 6]	
Panamint	MOA	6 am-10 pm M-F[1]	61 meters (200 feet) AGL to FL180[4, 5]	HI-DESERT TRACON
	ATCAA		FL180 to FL600[5, 6]	

Source: Edwards AFB, 2003; DoD, 2002a

[1] Normal operating hours are 6 am to 10 pm Monday through Friday but the Complex can be activated at any time.

[2] FL200 is Flight Level 200 (approximately 20,000 feet or 6,098 meters above MSL).

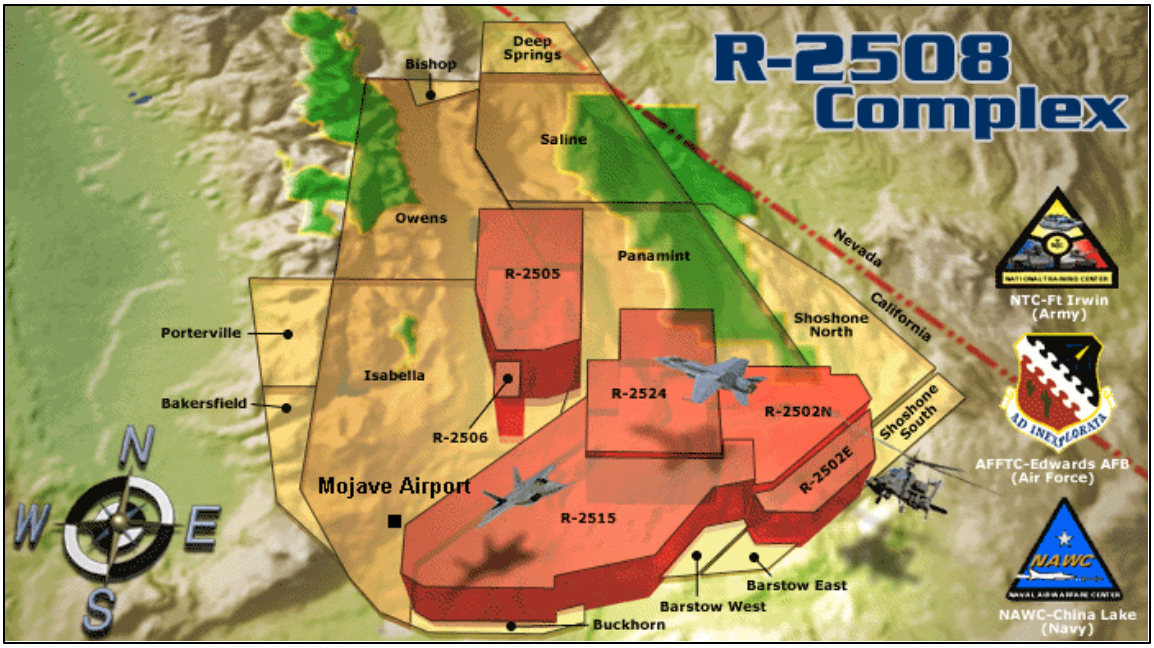
[3] MSL is mean sea level (6,000 feet above MSL is 1,829 meters above MSL).

[4] AGL is above ground level (200 feet is 61 meters).

[5] FL180 is approximately 18,000 feet above MSL or 5,488 meters above MSL.

[6] FL600 is approximately 60,000 feet above MSL or 18,293 meters above MSL.

Figure 4-1. Map of the R-2508 Complex



Scheduling and air traffic control within this area are critical to ensuring aircraft safety. This is especially true for civilian aircraft entering the complex. The EKAD and several of the Mojave Airport tenants have LOAs with the R-2508 Complex scheduling and controlling agencies. These letters allow civil use of the R-2508 Complex under certain conditions. The Central Coordinating Facility (CCF) is the scheduling agency for all activities within the R-2508 Complex. All aircraft requesting clearance to operate within the R-2508 Complex must notify CCF by 4 pm local time the day prior to the planned flight to gain approval. For weekend or holiday flights, CCF must be notified by 4 pm local time the last working day prior to the flight. (LOA R-2508 Complex Control Board, Edwards Air Force Base and NTPS, 2002) Persons requesting civil use approval in the R-2508 Complex must identify all areas in which the planned activity will take place. Any changes in flight plans must be forwarded to CCF on a real time basis. For any civil aircraft planning to land at Edwards AFB permission must first be obtained from Edwards AFB, Airfield Management.

Civil aircraft operating below 3,048 meters (10,000 feet) MSL are not required to contact ATC and would operate under "see-and-avoid" VFR. Civil aircraft operating above 3,048 meters (10,000 feet) MSL, but below FL180 (5,486 meters [18,000 feet MSL]) should, but are not required to, contact ATC and shall operate VFR. Under the current rules of the R-2508 Complex, only those civil aircraft that have entered into an LOA and require operations above FL180 will be schedule as participating aircraft. The air traffic controlling agency in the R-2508 Complex is the HI-DESERT TRACON; however, the SPORT controls traffic in R-2515. (DoD, 2002a); LOA R-2508 Complex Control Board, Edwards Air Force Base and NTPS, 2002) All civilian pilots operating in the R-2508 must be familiar with the requirements and procedures in the R-2508 Complex User's

Handbook and AFFTC Instruction 11-1 "Aircrew Operations." (DoD, 2002a) HI-DESERT TRACON and the AFFTC commander can suspend or cancel clearance at anytime. The LOAs between the EKAD and the Mojave Airport tenants and the R-2508 Complex do not give blanket approval for all internal restricted areas. Civil use flight plans must be approved by the controlling agency of each internal restricted area the flight will enter. (LOA R-2508 Complex Control Board, Edwards Air Force Base and NTPS, 2002) Pilots operating within the restricted areas are responsible for vertical and lateral confines of the area for which they have received clearance. Pilots must also operate under VFR.

Edwards AFB operates a national range in accordance with Public Law 81-60 and DoD Directive 3200.11, *Use, Management*, and *Operation of Department of Defense Major Range and Test Facilities.* (DoD, 2002a) These regulations provide a framework for the operation of a national range with regard to range safety. The purpose of these requirements is to ensure that the launch and flight of launch vehicles pose no greater threat to the general public than that resulting from the overflight of conventional aircraft. (DoD, 2002a) Use of the Edwards AFB Range requires compliance with the operating rules and procedures of the range and the Range Commander.

The ROI contains 17 public and private airports. Any flight plans that will enter the airspace of a surrounding airport must be coordinated with the individual airport. Emergency landings are coordinated with the applicable controlling agency and the airport at which the landing is to occur.

The very southeast portion of the ROI is outside of the R-2508 Complex. This area contains several en route airways used by commercial and private aircraft. The route with the highest operating altitude is V442 at 3,049 meters (10,000 feet) above MSL.

4.1.2 Existing Airport Operations

Aircraft using the Mojave Airport include general aviation propeller and turbo propeller planes, test and experimental aircraft, commercial air carrier jets, and high performance military and non-military jets. The control tower communications logs for 2001 indicate that approximately 18,301 aircraft take-offs and landings occurred during that year. (Kern County, 2003c) All take-off and landing activities are conducted under VFR.

The airport manager controls the on-ground activities. The EKAD offers fuel services, aircraft tie down, hangar and building leases, emergency response services and security services.

The Mojave Airport provides Jet A and 100 Low Lead gasoline fuel services for aircraft at the airport. Only EKAD personnel can conduct fuel service activities at the Mojave Airport (Fueling Policy). The KCAPCD issued EKAD a Permit to Operate for each of its fuel and gasoline storage and dispensing systems. (Kern County, 2003a) The permits issued by KCAPCD have operational, air quality, testing and emission limit requirements. The EKAD Administrative Code, Section 4-2.11 Fuel Handling, addresses safety measures that must be followed by EKAD personnel and customers before, during,

and after providing fuel services. In accordance with the EKAD Administrative Code, a fueling policy was established to address all fueling activities at the Mojave Airport. This policy details requirements regarding proper fueling techniques, storage of fuel and salvage fuel, and spill response and reporting. In addition, EKAD has an SPCC Plan for the operation of the above ground storage tanks used for fuel storage. The SPCC was developed per EPA 40 CFR Part 112 and California Health and Safety Code, Section 25270-25270.13. (EKAD, 2003) Procedures and measures required by the SPCC include

- Security barriers and monitoring,
- Daily visual inspections,
- Tank drain locks,
- Employee safety and spill prevention training,
- Spill response kits, and
- Hydrocarbon leak detection systems.

The Mojave Airport offers rental space for aircraft tie downs, storage and maintenance and industrial purposes. Persons leasing these spaces are required to follow all airport safety and health requirements of the EKAD Administrative Code, Part 4, Property. Safety and health requirements may include proper storage of hazardous materials and flammable substances, proper housekeeping in and around the rental space, performance of maintenance activities in designated areas and proper conduct of the lessees on airport grounds. (EKAD, 2001) In addition, lease agreements make reference to compliance with portions of Federal regulations 29 CFR Part 1910 and 40 CFR; California Code of Regulations Titles 8, 22, 19, 26 and 27; Kern County Health and Safety Code; Kern County Air Pollution Control District regulations; and California Department of Transportation, Division of Aeronautics regulations.

The emergency response services at Mojave Airport consist mainly of the EKAD Aerospace Rescue Fire Fighting (ARFF) unit. The ARFF unit is three-person fire department with the ability to expand to seven persons as needed. (Mojave Airport, August 2003c) The ARFF operates from 7 am to 5 pm Monday through Friday and on weekends as needed. The ARFF responds to on-site emergencies and spills of jet fuel. The ARFF crew is trained and qualified in fire and rescue techniques, and its response requirements follow the guidelines of the National Fire Protection Standard 402 and the USAF Defense Logistics Agency Manual 8210.1. (Mojave Airport, August 2003c) The ARFF goes through training and evaluation by the Government Flight Representative on a quarterly basis. The Kern County Fire Department, located one quarter of a mile from the Mojave Airport, provides 24-hour support to the ARFF. Hall Ambulance provides on-site, 24-hour, land-based emergency medical services, and Mercy Air provides on-site, 24-hour, air-based emergency medical services. (Mojave Airport, August 2003c) Edwards AFB provides additional local emergency response services via the mutual aid system. Edwards AFB can provide USAF ARFF crews, security forces, emergency medical services, and an Incident Commander. A community response plan is in place to communicate and coordinate emergency alerts and responses to the surrounding community.

In the event of an accident at the Mojave Airport involving a launch vehicle, EKAD has developed a Launch Site Accident Investigation Plan (LSAIP). The LSAIP has detailed procedures for reporting, responding to, and investigating launch site accidents as defined by Section 420.05 of 14 CFR, Part 420. The procedures include

- Immediate notification of any accident to the appropriate agencies (e.g., FAA, National Transportation Safety Board, Kern County Fire Department);
- Submittal of a written report detailing the date, time, location and description of the accident;
- Development of a pre-incident plan for all designated activities;
- Containment and minimization of the accident consequences;
- Preservation of any physical evidence;
- Establishment of site safety and security;
- Implementation of a preliminary investigation; and
- Cooperation and coordination with Federal investigators.

The Mojave Airport has a security team that provides 24-hour security services to the airport and its industrial park. The security team comprises 33 former Los Angeles and Kern County Sheriff's Office members and firefighters. (Mojave Airport, August 2003c) The team rotates two-person crews to conduct patrols and monitor surveillance cameras. The California Highway Patrol and Kern County Sheriff's Office, which have offices located adjacent to the airport, provide additional assistance on an as-needed basis. (Mojave Airport, 2003c) The airport also has a four-person maintenance crew that maintains the water, sewage, electrical and road systems as well as the airport runways, taxiways and structures.

Employees of the EKAD are required to comply with the EKAD Illness and Injury Prevention Program. (EKAD, 2001) This program was established to provide a safe and healthy working environment for employees. The program includes

- Installing mechanical and physical safeguards,
- Conducting safety and health inspections,
- Training all employees in proper safety and health practices,
- Providing appropriate personal protective equipment,
- Developing and enforcing safety and health rules,
- Investigating and preventing recurrence of accidents, and
- Awarding recognition and incentives for safety and health excellence.

In addition, EKAD has a controlled substance program that prohibits any employee from working under the influence of, possessing, or trafficking legal or illegal drugs in or on airport property that impair the performance of the employee.

4.2 Hazard Analysis Including Safety and Health Protections

The FAA's Licensing and Safety Requirements for Operation of a Launch Site state that to gain approval for a launch site location, an applicant shall demonstrate that for each launch point proposed for the launch site, at least one type of expendable or reusable

launch vehicle can be flown from the launch point safely. (14 CFR Part 420.19(a)) If an applicant proposes to have more than one type of launch vehicle flown from a launch point, the applicant shall demonstrate that each type of expendable or reusable launch vehicle planned to be flown from the launch point can be flown from the launch point safely. (14 CFR 420.19(b)) It is therefore necessary for the EKAD to demonstrate that both Concept A and Concept B launch vehicles can be flown and/or launched safely from the Mojave Airport.

A hazard analysis is a necessary part of the Mission and Safety Review for the FAA licensing determination to assess the possible hazards associated with proposed ground, flight, and landing operations. Launches of Concept A and B vehicles from the Mojave Airport would require launch specific licenses from the FAA and each launch applicant would be required to conduct a risk analysis. Potential launch operators would estimate the casualty expectation associated with their proposed flight corridors or impact dispersion areas (if in a populated area) for nominal and non-nominal flights. The estimated casualty expectation cannot exceed 30×10^{-6} to receive a launch license. The Mission and Safety Review would consider these items, and, therefore, they will not be discussed in detail in this EA. However, analysis of the safety and health implications of launch related operations and activities that have the potential for environmental impact are considered in this EA.

For over 25 years, the Mojave Airport has had general safety and health policies/procedures in place for handling explosive materials including rocket propellants. In accordance with the Mojave Airport Reusable Launch Vehicle Site License Application (August, 2003), EKAD would submit an explosive site plan for all flight/landing and ground operations for proposed Concept A and B operations. The EKAD would have a contingency/emergency plan for handling these materials and procedures for providing notification to the proper authorities in the event of an incident. The Kern County Fire Marshall would issue permits for use, storage, and handling of propellants and explosive materials, as required. Concept A and B tenants would comply with inventory and safety/separation requirements specifically for handling solid and liquid propellants. (Mojave Airport, 2003c) Examples of these requirements may include the Quantity Distance Separation requirements specified in NASA Explosive Safety Standard, NSS 1740.12 (DoD 6055.9) and the National Fire Protection Administration (NFPA) standards including NFPA 30 Flammable and Combustible Liquids Code. The Mojave Airport has developed and will implement a launch site accident investigation plan which would address operations of all tenants including those proposing to launch Concept A and B vehicles. The EKAD has a fuel policy governing safety procedures with which operators/tenants proposing to launch Concept A and B vehicles would need to comply. Also, EKAD would ensure that the operations of one operator/tenant would not adversely affect the operations of other operators/tenants. (Mojave Airport, 2003c)

4.2.1 Ground Operations

Ground operations involved in servicing and preparing the launch vehicle typically involve industrial activities. There are various hazards associated with these activities including

- Spill/fire/explosion of propellant/fuel storage, transport, handling, and loading;
- Traffic accidents due to increased activity on and off site; and
- Occupational mechanical accidents.

4.2.1.1 Propellant Storage, Transport, Handling, and Loading Accidents

Jet-A/Kerosene. Jet-A aviation fuel (also called kerosene) is a liquid hydrocarbon fuel. It is flammable and can explode if mixed with air and then ignited in a confined space. Jet-A/kerosene can also explode if mixed with oxidizers. Toxic products can be emitted from the burning Jet-A/kerosene. Unburned vapors can irritate skin, are moderately toxic if inhaled and can cause severe hazards if ingested. (Chemical Propulsion Information Agency, 1984) Concept A launch operations would require a maximum of 21,804 liters (5,760 gallons) of Jet-A fuel annually. Concept B launch operations would require a maximum of 85,172 liters (22,500 gallons) of kerosene annually to support the estimated 50 launches per year.

The proposed Concept A and Concept B operations would not necessitate changes to the existing safety and health and spill prevention/response practices for Jet-A/kerosene at the Mojave Airport. Such existing practices are included in the Fueling Policy for EKAD, the SPCC Plan, the Mojave Airport Reusable Launch Vehicle Site License Application, August 2003, and the ChevronTexaco Airport Dealer Quality Control Guide. If additional storage capacity is required to support Concept B operations, 34,826 liter-capacity (9,200 gallons) tank trucks could be used as short-term temporary storage. The proposed tank trucks would be parked between existing buildings on the Mojave Airport within a fenced area and would meet all established explosive quantity distance safety requirements. The FAA in issuing specific launch licenses would evaluate any additional safety procedures or requirements.

There would be some vapors released from fuel storage/transfer operations through evaporative losses. However, such vapors would be vented outside the building at a height that would provide adequate protection for personnel, buildings and the environment. Also, the total quantity of emissions indicated would not occur as a large acute (short term) exposure, but would occur as a slow vapor release over a long period of time. There is also the concern of spills of Jet-A/kerosene during handling and loading operations and subsequent fire or explosion. However, the Mojave Airport has extensive experience with Jet-A/kerosene and has established practices and procedures to handle the quantities of Jet A/kerosene needed for launch operations.

Nitrous Oxide (N_2O). N_2O is a colorless, nonflammable, nontoxic gas. It is chemically stable at room temperature. At elevated temperatures, it decomposes into nitrogen and oxygen and becomes a strong oxidizing agent to support combustion. It is stored and shipped as a liquefied compressed gas at atmospheric temperature (70^o F, 21.1^o C) or as a refrigerated liquid. Although non-toxic, N_2O poses danger as an asphyxiant. It can also be explosive if it comes in contact with combustible materials or if the storage cylinders are exposed to external heating. (Chemical Propulsion Information Agency, 1984)

For Concept A operations, the maximum amount of N_2O stored on-site would be 7,770 kilograms (17,130 pounds). N_2O would be delivered via refrigerated tank truck to the Mojave Airport. Specially designed storage tanks might be used for the N_2O; one such design is the Mobile Nitrous Oxide Delivery System (MONODS). MONODS was designed and built as a portable N_2O storage unit that could be used to fill a Concept A type launch vehicle. MONODS includes a 6,435-liter (1,700-gallon) tank, generator and heating/cooling unit. The storage vessel is constructed of materials that meet the American Society of Testing and Materials specification of SA-240-304 for stainless steel, meets the American Society of Mechanical Engineers Code and is registered with the National Board of Pressure Vessels.

The refrigerated N_2O is pumped into the MONODS allowing the N_2O to warm to room temperature increasing the tank pressure. Hazards include releases during N_2O transfer from refrigerated tanker to MONODS and transfer from MONODS to the launch vehicle. All the N_2O tanks were designed for safety according to applicable codes (including that of the American Society of Mechanical Engineers). The N_2O tank on the launch vehicle is filled and vented through the tank's forward bulkhead to keep vapor away from the hot side of the tank. Also, contact between N_2O and the solid rocket propellant should be avoided. To prevent N_2O from leaking near the solid rocket propellant, the valves and injectors are located on a bulkhead inside the N_2O tank. (FAA, 2003c) The N_2O is loaded into the launch vehicle using an established procedure that incorporates basic safety checks and monitoring. (FAA, 2003c) Two-person teams should be used when operating a pressurized system. One team member should be equipped with self-contained breathing apparatus. (Chemical Propulsion Information Agency, 1984) Additional safety precautions would be followed, these would include inspections of combustibles, maintaining established quantity distance relationships, and ensuring the availability of safety showers.

HTPB. HTPB is a solid rocket propellant that is classified as an explosive. If ignited, the HTPB will continue to burn in the presence of an oxidizer. Accidental explosions are possible if proper handling precautions (e.g., proper separation distances) are not taken. For proposed Concept A launches, the maximum on-site propellant storage would be 907 kilograms (2,000 pounds) of HTPB. (FAA, 2003c) The Mojave Airport has experience with solid rocket propellants like HTPB, and they have specific handling requirements for operations involving these propellants. (Mojave Airport, 2003c) The motor case, throat, and nozzle (CTN) that would be used for Concept A launch vehicles would contain HTPB. Additionally, the proposed action for Concept A launch operations includes specific vehicle design safety features. The CTN is a one-piece motor design that minimizes the number of possible leak paths. (FAA, 2003c)

LO_x. Rocket grade LO_x is a light-blue transparent liquid that can be used as an oxidizer. It is stored as a cryogenic liquid (i.e., it is stored at low temperatures). LO_x will not burn by itself, but will vigorously support combustion with combustible materials. When LO_x is stored in a closed system and refrigeration is not maintained, vessel rupture may occur due to overpressurization. (Chemical Propulsion Information Agency, 1984) Although

LO_x would not pose toxic risks, it would require special handling precautions. Workers must be equipped with protective equipment designed to prevent contact with the eyes or skin, and vapors must be kept away from sources of ignition and flammable materials. The Mojave Airport has developed procedures/policies to appropriately handle liquid propellants such as LO_x. (Mojave Airport, 2003c) It might be necessary for operators proposing to conduct Concept B launch operations to develop specific LO_x safety handling procedures given the quantities of combustibles that would need to be stored at the Mojave Airport to support these operations.

4.2.1.2 Traffic Accidents

The increased road traffic that would result from conduct of Concept A and B launch operations at the Mojave Airport would only add a few cars/trucks above existing traffic loads. There would be some more trucks delivering kerosene and LO_x to the Mojave Airport particularly during the years 2006 to 2008. There may be as many as 23 additional trucks carrying hazardous materials to the Mojave Airport per year during that time. This would likely represent only nine percent increase over the current annual hazardous materials shipments to the Mojave Airport. The increase would not be expected to significantly increase the number of accidents given that the Mojave Airport is currently working at three percent of capacity. (Mojave Airport, 2003b) Therefore, the increase in the number of shipments of hazardous materials should not significantly increase the number of traffic accidents on the roadways around the Mojave Airport.

All transport of hazardous materials would be in DOT approved packages and containers. The shipments would meet the DOT requirements including packaging design, marking, labeling, and placarding for shipment over public roadways. All hazardous materials transport would meet DOT Hazardous Materials Regulations, 49 CFR Parts 171, 172, 173, 174, 175, 176 and 177. These DOT requirements are intended to minimize potential releases, fires and explosions.

4.2.1.3 Occupational Mechanical Accidents

On-site work associated with the conduct of Concept A or B launch operations would be similar to that associated with industrial chemical operations. Exposure impacts and mitigation of propellant/fuel hazards were discussed above. Exposure to mechanical accidents should not differ significantly from current levels for the Mojave Airport because the number of operations associated with the conduct of Concept A and B launch operations would be relatively small given the number of operations airport wide.

4.2.2 Flight/Airspace and Landing Operations

A detailed flight hazard analysis will be conducted as part of a Mission and Safety Review under the auspices of the FAA before a determination is made on whether to license the proposed activities. Consequently, this section is intended to provide only a top-level assessment of hazards and mitigation measures. The potential hazards of flight/airspace and landing operations include limited airspace availability, limited airport operations, and nominal flight safety.

Emergency Landing Facilities

Edwards AFB would be a primary abort/emergency landing site because of availability of a 4,572-meter (15,000-foot) paved runway, multiple dry lake bed runways, and experience with experimental and unusual flight vehicles. Each vehicle operator would be required to coordinate their safety plans with Edwards AFB prior to beginning operations.

Limited Airspace Availability

Changes in airspace use can impact flight safety or limit airspace availability to other users. The FAA is charged with overall management of airspace and has established certain criteria and limits for use of various sectors of airspace. Specific permission is required from the controlling agency to penetrate active restricted airspace areas. For launches of Concept A vehicles from the Mojave Airport, permission to fly in the restricted R-2508 Complex airspace would be requested for a maximum of 6 flights per year. Likewise, for Concept B launch vehicles, permission to fly in the R-2508 Complex airspace would need to be requested. By 2008, Concept B proposes up to 50 flights per year. It is possible that permission for some Concept A or B flights will be denied. The authority over the R-2508 Complex would consider the requests; however, the authority will not permit any flights that would impact existing DoD missions/operations in the restricted airspace. Potential users of the Mojave Airport proposing to conduct launches would need to modify existing Letters of Agreement with the R-2508 Complex Control Board and Air Force Flight Test Center (Mojave Airport, 2003c) to negotiate requests for permission to use restricted airspace.

Limited Airport Operations

Expanding airport operations beyond reasonable capacities would have a detrimental effect on airport safety. Currently, airport operations are at three percent of capacity. (Mojave Airport, 2003b) The current annual flight rate at Mojave Airport is 18,301 flights. A maximum of six additional flights per year of Concept A launch vehicles and a maximum of 50 additional flights per year of Concept B vehicles would not have an impact on the airport operations.

Nominal Flight Safety

Multiple safety precautions would be used during nominal flights to assure safety. The PIC for each launch vehicle would have responsibility for flight safety decisions.

Concept A launch operations would include a mobile ground station for mission control with real-time telemetry data monitoring and recording. Mission control would provide data and recommendations to abort if parameters exceed normal mission operating limits. The PIC would also be responsible for shutting down the rocket motor burn system if parameters exceed normal mission limits. The vehicle propulsion system would also contain an internal automatic-shutdown mode should system critical operating parameters be exceeded. (FAA, 2003c) The vehicle has fault-tolerant life support system to ensure

that the pilot would have adequate oxygen during the mission. Mission rehearsals would be conducted with flight and ground support crew prior to each launch. A prelaunch check would examine all critical safety and high-risk systems. In the event of an emergency landing, the PIC would attempt to reach one of the designated emergency landing/abort areas. To reduce risk to nearby populations, the nominal flight ground track for Concept A missions was designed to avoid populated areas (see Figure 4-2). In the Figure, populated U.S. Census Bureau blocks that indicate the presence of one or more people are outlined in white lines. The average population density under the ground track is approximately six people per square mile.

Concept B operations would include a System Safety Program to examine and reduce risk during nominal flights. The PIC would be responsible for activating the FSS. This may consist of a number of steps, taken by the PIC to ensure that the vehicle glides to a safe landing at the primary landing location at the Mojave Airport or at a designated emergency landing location. The PIC might activate the FSS by turning off the engine run switch or closing the propellant pre-valves, in both instances stopping the flow of propellants to the engine and thereby stopping the engine. It may also be possible for the PIC to vent pressure in the LO_x tank or release the LO_x, which would also cause the engines to stop working. This process, however, may take up to a minute to complete and, therefore, would be used only if the other methods failed to cut the engine off. A prelaunch check would examine all critical safety and high-risk systems. In the event of an emergency landing, the PIC would attempt to reach one of the designated emergency landing/abort areas. To reduce risk to nearby populations, the nominal flight ground tracks for a smaller- and larger-end Concept B launch vehicle were designed to avoid populated areas (see Figures 4-3 and 4-4). In the Figures, populated U.S. Census Bureau blocks that indicate the presence of one or more people are outlined in white lines. The average population density under the ground track is six people per square mile.

4.2.3 Catastrophic Accidents Scenarios

For Concept A launch vehicles during nominal flight, there is an elevated risk area due to the steep reentry and the pull-out from the steep reentry. If there is a loss of control, the vehicle could potentially crash land. Also, if the launch vehicle fails to function as intended soon after separation from the carrier aircraft, the launch vehicle would attempt a steep descent carrying hazardous materials (e.g., HTPB). In terms of impact, for a nominal trajectory, the ground track does not include flights over populated areas. However, in a catastrophic accident, it would be likely that the crew would be seriously injured or killed. At the airport, the on-site fire department could respond, secure the site, but stay clear of the immediate area until the danger of explosions is diminished. It is expected that any fires resulting from a failure could be fought by the fire department. Additional off-site emergency response capability could also be used if necessary.

For Concept B launch vehicles, there is an elevated risk area for catastrophic accidents at the end of the runway if there is a failure of the vehicle during the rocket-powered takeoff. The vehicle may not have enough energy to make an emergency landing and therefore, the vehicle may crash off the runway. Such an accident would cause a rupture of the propellant tanks, which could result in explosion and fire. There would likely be

significant damage and heat in the immediate vicinity of the crash. There are no known populated areas in the vicinity of the takeoff area and no impacts would be expected to populated areas from an explosion. However, it would be expected that the crew would be seriously injured or killed. Emissions from the open burn of LO_x and kerosene would produce similar products to those of a launch engine burn including CO, CO_2, and water (H_2O). There may be more particulate matter (unburned hydrocarbons) forming a smoke cloud from an accident burn. None of the combustion products are considered significantly toxic. On- and off-site emergency response capabilities would be used as necessary.

Figure 4-2. Concept A Nominal Ground Track Plotted Over Populations

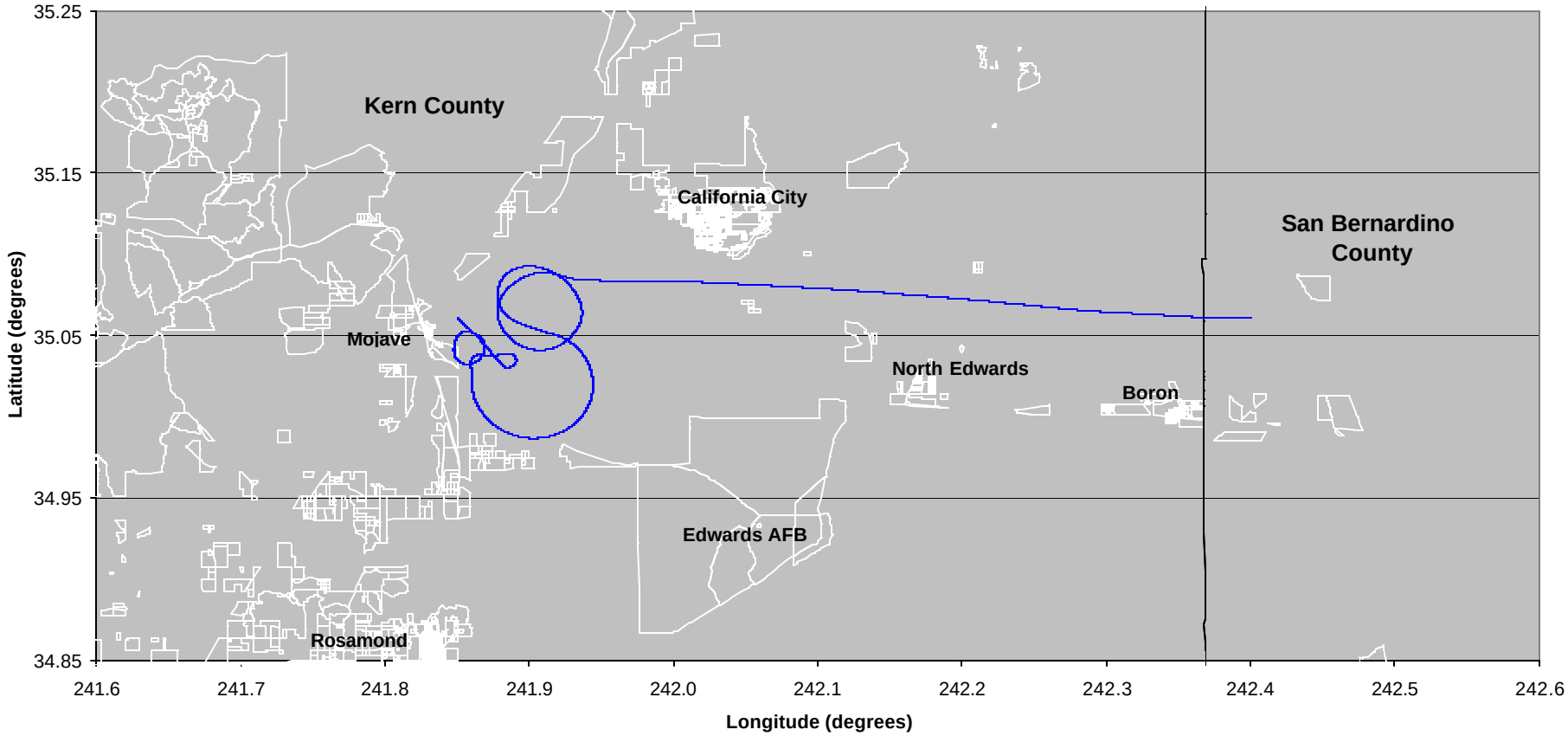


Figure 4-3. Concept B Smaller Vehicle Nominal Ground Track Plotted Over Populations

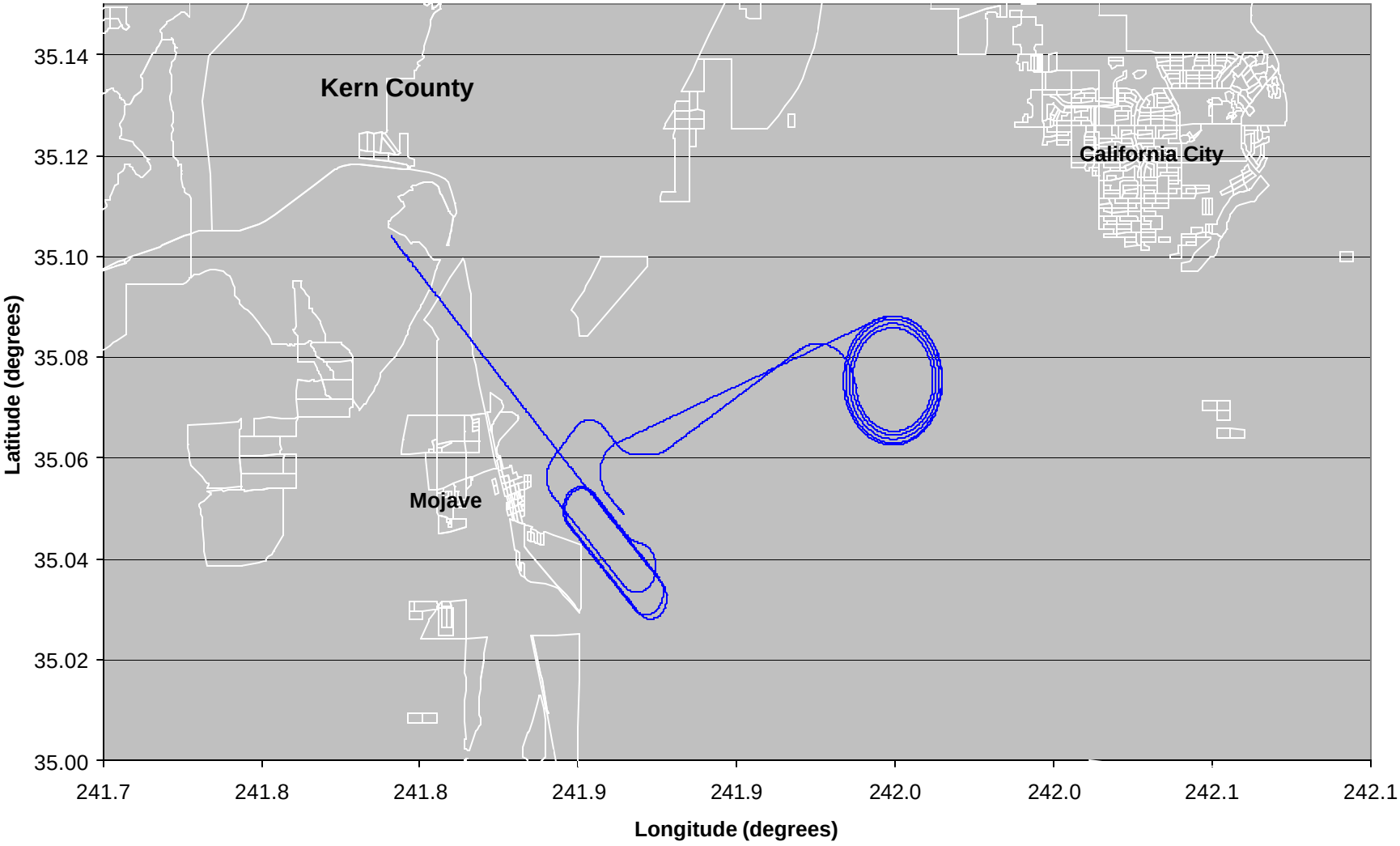
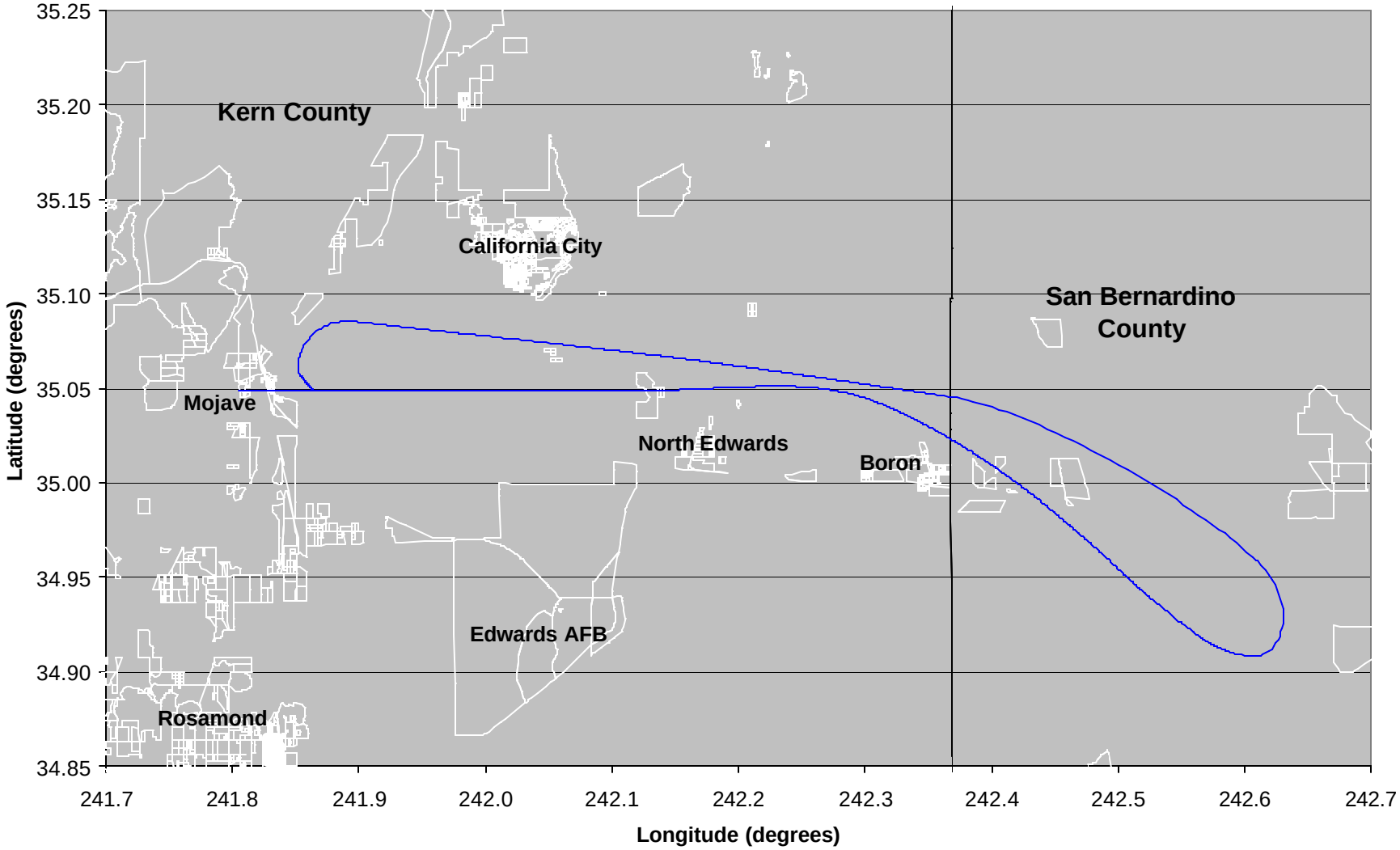


Figure 4-4. Concept B Larger Vehicle Nominal Ground Track Plotted Over Populations



This Page Intentionally Left Blank

5. Environmental Impacts

5.1 Air Quality

Impacts to air quality would be considered significant if they conflicted with or obstructed implementation of the applicable air quality plan; violated any air quality standard or contributed to an existing or projected violation; or cumulatively increased any criteria pollutant for which the region is in non-attainment under applicable Federal or state ambient air quality standards. Significant impacts also include exposure of sensitive receptors to substantial pollutant concentrations or the creation of objectionable odors, which affect a substantial number of people.

5.1.1 Proposed Action

Air emissions may be generated during launch/landing operations, pre- and post-launch ground operations, and accidents. The proposed action includes emissions from launches of Concept A and B vehicles. The proposed action does not include any changes to the physical structure of the airport (e.g., runway) or any construction activities; therefore there are no construction vehicles or associated emissions. The air quality at the Mojave Airport in Eastern Kern County is in Federal non-attainment (serious) and State non-attainment (moderate) for ozone, and state non-attainment for PM_{10}. The proposed action would require a Federal conformity analysis if the air emissions exceed certain de minimis levels or if the total emissions are regionally significant. Emissions are regionally significant when the emissions from the action equal or exceed 10 percent of the air quality control area's emissions inventory for any criteria pollutant. This analysis will consider emissions in two categories, above 914 meters (3,000 feet) and below 914 meters (3,000 feet). The 914 meter (3,000 feet) altitude is an appropriate cutoff because the Federal government uses 914 meters (3,000 feet) and below for contributions of emissions to the ambient air quality and for de minimis calculations. (EPA, 1992)

Air Quality Impacts from Concept A Launch Operations

Air quality impacts associated with Concept A launch operations were examined in terms of emissions from launch/landing operations and from routine pre-launch operations.

Air Emissions from Launch/Landing Operations. Concept A launch vehicles include two components, a carrier aircraft and a mated suborbital launch vehicle. The aircraft would have turbojet engines using Jet A-1 fuel. There would be emissions from both the carrier aircraft and the launch vehicle components. To make emission calculations of the turbojet, it is assumed the aircraft would most closely resemble the T-38 Tiger aircraft which uses two J85-GE-5F engines. To estimate aircraft emissions, emission factors (e.g., pound releases per takeoff/landing cycle) found in the EPA document Compilation of Air Pollutant Emission Factors (EPA, 1980) for the T-38 aircraft were used. Table 5-1 provides the total emissions for takeoff/landing based on the proposed number of flights of the carrier aircraft. The takeoff/landing cycle includes idle, takeoff, climb out to 914 meters (3,000 feet), descent starting at 914 meters (3,000 feet), approach, and landing. (EPA, 1980)

Table 5-1. Estimated Emissions for Carrier Aircraft During Takeoff/Landing Cycle (below 914 meters [3,000 feet])

Year	Number of Launches	CO kilograms (pounds)	NO_x kilograms (pounds)	Total HC[1] (VOCs) kilograms (pounds)	SO_x[2] kilograms (pounds)	Particulates kilograms (pounds)
2003	3	112.6 (248.2)	1.7 (3.7)	14.2 (31.3)	0.8 (1.9)	34 (75)
2004	6	225.1 (496.3)	3.3 (7.3)	28.3 (62.5)	1.7 (3.7)	68 (150)
2005	6	225.1 (496.3)	3.3 (7.3)	28.3 (62.5)	1.7 (3.7)	68 (150)
2006	6	225.1 (496.3)	3.3 (7.3)	28.3 (62.5)	1.7 (3.7)	68 (150)
2007	6	225.1 (496.3)	3.3 (7.3)	28.3 (62.5)	1.7 (3.7)	68 (150)
2008	6	225.1 (496.3)	3.3 (7.3)	28.3 (62.5)	1.7 (3.7)	68 (150)

[1]HC are total hydrocarbons including unburned hydrocarbons and organic pyrolysis products. For this study, HC will be conservatively considered VOCs so as to compare with VOC regulatory limits.
[2]SO_x are sulfur oxides and sulfuric acid as sulfur dioxide.
Source of emission factors: Compilation of Air Pollutant Emission Factors (EPA, 1980), Vol. II, Table II-1-9 Emission Factors per Aircraft per Landing/Takeoff Cycle-Civil Aircraft, February 1980

The emission factors used in developing Table 5-1 above are from EPA, 1980 and are listed in Table 5-2.

Table 5-2. Emissions (per Takeoff/Landing Cycle) for Carrier Aircraft (assumed to be T-38 Tiger Aircraft)

CO kilograms (pounds)	NO_x kilograms (pounds)	Total HC kilograms (pounds)	SO_x kilograms (pounds)	Particulates* kilograms (pounds)
38 (83)	0.55 (1.22)	4.73 (10.42)	0.28 (0.62)	11 (25)

*No particulates were specified for T-38 Tiger so it was assumed that the particulates were similar to the F-14 Tomcat

Emissions from the launch vehicle would occur from the combustion of N_2O and HTPB. For each flight, there would be an estimated 1,295 kilograms (2,855 pounds) of N_2O and 228 kilograms (503 pounds) of HTPB. (FAA, 2003c) The emissions would begin at an altitude of between 16 to 20 kilometers (10 to 12 miles) (troposphere and beginning of stratosphere). Because these emissions would originate far above the applicable altitude (914 meters [3,000 feet]) for the Federal or California ambient air quality standards, these emissions are not considered against these air ambient quality standards. The emissions are based on the propellant emission factors in Table 5-3, which are similar to those used in the Navy FA-18E/F EA. These emission factors are refined because Concept A launch

Table 5-3. Estimated Weight Fractions of Emissions from N_2O and HTPB

CO_2	CO	H_2O	N_2
0.03	0.20	0.22	0.54

Source: Information in U.S. Department of Navy, 1996 adapted by ICF Consulting

vehicles propose to use N_2O and HTPB rather than perchlorate and HTPB as in the Navy EA. Thus, it was assumed that

- N_2O fully decomposes to oxygen and nitrogen,
- The oxygen fully reacts with the hydrogen in the HTPB to form water,
- The oxygen reacts with the carbon in HTPB to produce roughly ten times as much CO as CO_2 (similar to FA-18E/F EA), and
- The nitrogen is released as N_2.

To estimate the total emissions in Table 5-4, the emissions fractions were multiplied by the total amount of propellant used (1,523 kilograms [3,358 pounds]) and the number of flights expected per year.

Table 5-4. Total Propellant Emissions Annually for Concept A Launches Above 3,000 Feet

Year	Number of Launches	CO_2 kilograms (pounds)	CO kilograms (pounds)	H_2O kilograms (pounds)	N_2 kilograms (pounds)
2003	3	137 (302)	914 (2,015)	1,005 (2,216)	2,468 (5,440)
2004	6	274 (604)	1,828 (4,030)	2,011 (4,433)	4,935 (10,880)
2005	6	274 (604)	1,828 (4,030)	2,011 (4,433)	4,935 (10,880)
2006	6	274 (604)	1,828 (4,030)	2,011(4,433)	4,935 (10,880)
2007	6	274 (604)	1,828 (4,030)	2,011 (4,433)	4,935 (10,880)
2008	6	274 (604)	1,828 (4,030)	2,011 (4,433)	4,935 (10,880)
Total	33	1,508 (3,324)	10,053 (22,163)	11,058 (24,379)	27,143 (59,840)

Source: FAA, 2003

There are also emissions from the carrier aircraft above 914 meters. Although these emissions were considered, it was generally assumed that aircraft emissions from the six Concept A flights per year would be relatively small considering the 18,301 annual aircraft flights from Mojave Airport. The propellant is fully expended above 914 meters (3,000 feet); therefore, there are no propellant combustion emissions in Concept A during landing.

Air Emissions from Routine Launch Preparation Operations. For Concept A launch operations, emissions can also occur from support equipment used during ground operations. This could include various trucks and equipment, although there would be relatively few used and therefore few emissions would be expected to result from their use. There would also be air emissions from fueling the carrier aircraft and storage of additional fuels. Each flight of the carrier aircraft would consume 2,903 kilograms (6,400 pounds) of Jet-A fuel. (FAA, 2003c) This would equal 21,804 liters (5,760 gallons) per year based on 1.25 liters per kilogram (0.15 gallons per pound) and 6 flights per year. Fuel use at the Mojave Airport during the 12-month period from July 2002 to June 2003 was 7,933,837 liters (2,095,898 gallons). (Mojave Airport, 2003b) An additional 21,804 liters (5,760 gallons) of fuel per year represents a small increase in annual Jet-A usage at the airport and, therefore, the emissions from storage and dispensing as a result of activities related to Concept A launch operations would not be significant.

To estimate needed deliveries of Jet-A fuel and N_2O, it was assumed that 2,903 and 1,295 kilograms (6,400 and 2,855 pounds), respectively, is needed per flight. In determining the number of trucks, it was assumed that each Jet-A fuel truck would carry 28,122 kilograms (34,826 liters) (62,000 pounds [9,200 gallons]) and each N_2O truck would carry 11,340 kilograms (11,256 liters) (25,000 pounds [3,000 gallons]). It was also assumed that one truck per flight is needed to bring the motor CTN containing solid rocket propellant (HTPB). For Concept A in 2008, approximately eight trucks would be needed to bring propellants to the Mojave Airport. The truck traffic would produce emissions as estimated in Table 5-5. It was assumed that each truck trip would be 80 kilometers (50 miles). The emission rates were based on heavy-duty diesel powered vehicles traveling 30 miles per hour based on California's emission factor model. (California Environmental Protection Agency, Air Resource Board, 2002) The rates are 0.81 grams/kilometer (0.05 ounces/mile), 5.02 grams/kilometer (0.28 ounces/mile), 5.16 grams/kilometer (0.29 ounces/mile), and 0.40 grams/kilometer (0.02 ounces/mile) for hydrocarbons (VOCs), CO, NO_x, and PM_{10}, respectively.

Table 5-5. Total Emissions Annually for Trucks to bring Kerosene, N_2O, and HTPB for Concept A Launch Operations

Year	Flights per year	Kerosene Trucks	N_2O Trucks	HTPB Trucks	Total trucks	CO kilograms (pounds)	NO_x kilograms (pounds)	VOC kilograms (pounds)	PM kilograms (pounds)
2003	3	1	1	3	5	2.0 (4.4)	2.1 (4.6)	0.3 (0.7)	0.2 (0.4)
2004	6	1	1	6	8	3.2 (7.1)	3.3 (7.3)	0.5 (1.1)	0.3 (0.6)
2005	6	1	1	6	8	3.2 (7.1)	3.3 (7.3)	0.5 (1.1)	0.3 0.6)
2006	6	1	1	6	8	3.2 (7.1)	3.3 (7.3)	0.5 (1.1)	0.3 (0.6)
2007	6	1	1	6	8	3.2 (7.1)	3.3 (7.3)	0.5 (1.1)	0.3 (0.6)
2008	6	1	1	6	8	3.2 (7.1)	3.3 (7.3)	0.5 (1.1)	0.3 (0.6)
Total	33	6	6	33	45	18 (40)	19 (41)	2.9 (6.4)	1.5 (3.2)

Air Quality Impacts from Concept B Launch Operations

Air quality impacts associated with Concept B launch operations were examined in terms of air emissions from launch/landing operations and from routine launch preparation operations.

Air Emissions from Launch/Landing Operations. The air emissions from Concept B launch operations are primarily from the rocket motor. The propellants are LO_x and either kerosene or alcohol. For this analysis, it was assumed that kerosene would be used. Possible emissions would include CO, CO_2, hydrogen (H_2), and H_2O. The emission weight fractions for CO, CO_2, H_2, and H_2O are listed in Table 5-6. The only criteria pollutant among these is CO, and Kern County is in attainment for CO. To develop conservative estimates of CO, maximum CO fractions (estimated at the rocket nozzle) were used. During a launch, the CO emitted would be expected to oxidize fully to CO_2 in the hot exhaust cloud; likewise, the H_2 would fully oxidize to H_2O.

Table 5-6. Weight Fractions of Emissions from LO_x and Kerosene Propellants

CO_2	CO	H_2	H_2O
0.49	0.20	0.0042	0.30

Source: DOT, 2002

The data in Table 5-7 are only for emissions during the first 914 meters (3,000 feet) of flight because only these emissions are considered in the de minimis estimates associated with the ambient air quality standards. To calculate the emissions within the first 914 meters (3,000 feet), several assumptions were made including:

- During the years 2003 through 2005, smaller Concept B launch vehicles would be used and during 2006 through 2008, the larger vehicle sizes would be used.
- The amount of propellant per launch in 2003 through 2005 would be 340 kilograms (750 pounds) LO_x and 136 kilograms (300 pounds) kerosene. The amount of propellant per launch in 2006 through 2008 would be 3,402 kilograms (7,500 pounds) LO_x and 1,361 kilograms (3,000 pounds) kerosene. (FAA, 2003)
- Flight during the first 914 meters (3,000 feet) would last approximately 30 seconds.
- For launches between 2003 and 2005, it was assumed that all of the fuel would be expended in 90 seconds so the fuel expended during the first 914 meters (3,000 feet) of flight would be 30 seconds divided by 90 seconds times the total quantity of fuel (i.e., 476 kilograms [1,050 pounds]). For launches between 2006 and 2008, it was assumed that all of the fuel would be expended in 240 seconds of flight so the fuel expended during the first 914 meters (3,000 feet) flight would be 30 seconds divided by 240 seconds times the total quantity of propellant (i.e., 4,763 kilograms [10,500 pounds]).

The propellant emissions per year for each pollutant (in Table 5-7) were calculated by multiplying the fuel use in the first 914 meters (3,000 feet) times the weight fractions in Table 5-6 times the number of launches per year.

Table 5-7. Total Propellant Emissions Annually for Concept B Launches Below 914 meters (3,000 feet)

Year	Number of Launches	Propellant Use Per Flight kilograms (pounds)	CO_2 kilograms (pounds)	CO kilograms (pounds)	H_2 kilograms (pounds)	H_2O kilograms (pounds)
2003	0	159 (350)	0 (0)	0 (0)	0 0)	0 (0)
2004	0	159 (350)	0 (0)	(0)	0 (0)	0 (0)
2005	10	159 (350)	778 (1,715)	318 (700)	6.8 (15)	476 (1,050)
2006	25	590 (1,300)	7,223 (15,925)	2,948 (6,500)	62 (137)	4,423 (9,750)
2007	30	590 (1,300)	8,668 (19,110)	3,538 (7,800)	74 (164)	5,307 (11,700)
2008	150	590 (1,300)	14,447 (31,850)	5,897 (13,000)	124 (273)	8,845 (19,500)
Total	115	-	31,116 (68,600)	12,701 (28,000)	268 (588)	19,051 (42,000)

Emissions above 914 meters (3,000 feet) were also considered to determine any other environmental impacts (e.g., global warming, ozone depletion). Emissions listed in Table 5-8 were estimated to result from the LO_x and kerosene burned during a mission above 914 meters (3,000 feet) (see above for descriptions of assumptions and calculations of propellant used above 914 meters [3,000 feet]).

Table 5-8. Total Propellant Emissions Annually for Concept B Launches Above 914 meters (3,000 feet)

Year	Number of Launches	Propellant Use Per Flight kilograms (pounds)	CO_2 kilograms (pounds)	CO kilograms (pounds)	H_2 kilograms (pounds)	H_2O kilograms (pounds)
2003	0	318 (700)	0 (0)	0 (0)	0 ()	0 (0)
2004	0	318 (700)	0 (0)	0 (0)	0 ()	(0)
2005	10	318 (700)	1,556 (3,430)	635 (1,400)	14 (30)	953 (2,100)
2006	25	4,173 (9,200)	51,120 (112,700)	20,865 (46,000)	438 (966)	31,298 (69,000)
2007	30	4,173 (9,200)	61,344 (135,240)	25,038 (55,200)	526 (1,159)	37,557 (82,800)
2008	50	4,173 (9,200)	102,240 (225,400)	41,730 (92,000)	876 (1,932)	62,596 (138,000)
Total	115	-	216,259 (476,770)	88,269 (194,600)	1,853 (4,086)	132,404 (291,900)

During descent and landing, no propellants are burned, thus, there are no emissions.

Air Emissions from Routine Launch Preparation Operations. Air emissions may be generated during fueling the launch vehicle and storage of additional fuels. For flight of the small and large-end vehicles, 136 kilograms (300 pounds) and 1,361 kilograms (3,000 pounds) of kerosene, respectively, would be consumed during launch. (FAA internal communications, September 4, 2003) For year 2008 (the year with the greatest proposed use of fuel), an annual maximum of 85,163 liters (22,500 gallons) was estimated based on the large vehicle use of 1,361 kilograms (3,000 pounds) per flight; 50 flights per year, and 0.15 gallons per pound of kerosene. Currently, fuel use at Mojave Airport during the 12-month period from July 2002 to June 2003 was 7,933,837 liters (2,095,898 gallons). (Mojave Airport, 2003b) An additional 85,163 liters (22,500 gallons) of fuel per year represents a small increase in annual kerosene (Jet-A) usage at the airport and, therefore, the emissions from storage and dispensing as a result of activities related to Concept B launch operations would not be significant. The maximum current allowable emission of VOCs based on the airport's SPCC Plan (EKAD, 2003) is 2,185 kilograms (4,818 pounds) per year. Assuming there is no additional need for above ground storage capacity at the Mojave Airport, it can be conservatively assumed that the emissions may

reach 2,185 kilograms (4,818 pounds) per year of VOCs. However, VOC emissions would not exceed the allowable standard.

Emissions from Concept B launch operations can also occur from use of ground support equipment, including delivery trucks, pressurization carts, air conditioner, and pickup trucks. It is expected that these would be relatively few in number and therefore would have few emissions. For delivery of kerosene and liquid oxygen, it was assumed that

- 136 and 345 kilograms (300 and 760 pounds) of kerosene and LO_x, respectively, would be needed per flight during years 2003-2005,
- In years 2006-2008, additional trucks would be needed to handle the 1,361 and 3,402 kilograms (3,000 and 7,500 pounds) of kerosene and LO_x per flight, respectively,
- Each kerosene truck would carry 28,123 kilograms (62,000 pounds) or 34,826 liters (9,200 gallons) and each LO_x truck would carry 17,418 kilograms (38,400 pounds) or 11,356 liters (3,000 gallons), and
- Approximately 15 trucks in year 2008 would be needed to bring propellants to Mojave Airport to support the Concept B launches.

The truck traffic would produce emissions as shown in Table 5-9. It was assumed that each truck trip would be 80 kilometers (50 miles). Emission rates developed for heavy-duty diesel powered vehicles traveling 30 miles per hour were based on California's emission factor model. (California Environmental Protection Agency, Air Resources Board, 2002) The rates are 0.81 gram/kilometer (0.05 ounce/mile), 5.02 grams/kilometer (0.28 ounce/mile), 5.16 grams/kilometer (0.29 ounce/mile), and 0.40 gram/kilometer (0.02 ounce/mile) for hydrocarbons (VOCs), CO, NO_x, and PM_{10}, respectively.

Table 5-9. Total Estimated Annual Emissions from Trucks Delivering Kerosene and LO_x to Support Concept B Launches

Year	Flight/year	Kerosene Trucks	LO_x Trucks	Total Trucks	CO kilograms (pounds)	NO_x kilograms (pounds)	VOC kilograms (pounds)	PM kilograms (pounds)
2003	0	0	0	0	0 (0)	0 (0)	0 (0)	0 (0)
2004	0	0	0	0	0 (0)	0 (0)	0 (0)	0 (0)
2005	10	1	1	2	0.8 (1.8)	0.8(1.8)	0.1 (0.3)	0.1 (0.1)
2006	25	2	6	8	3.2 (7.1)	3.3 (7.3)	0.5 (1.1)	0.3 (0.6)
2007	30	2	7	9	3.6 (8.0)	3.7 (8.2)	0.6 (1.3)	0.3 (0.6)
2008	50	3	12	15	5.9 (13)	6.4 (14)	1.0 (2.1)	0.5 (1.1)
Total	115	8	26	34	14 (30)	14 (31)	2.2 (4.9)	1.9 (2.4)

Air Quality Impacts from Proposed Action (both Concepts A and B)

To determine the impacts to air quality from the proposed action, the air emissions estimated for Concept A and Concept B were summed. Additionally, emissions were estimated separately below 914 meters (3,000 feet) and above 914 meters (3,000 feet) to better evaluate impacts against applicable ambient air quality standards and against other environmental impacts that occur in upper altitudes (e.g., global warming, ozone depletion, etc). The proposed action would not conflict with or obstruct the implementation of any applicable air quality plans.

Air Emissions below 914 meters (3,000 feet). To determine the potential ambient air quality impacts, emissions below 914 meters (3,000 feet) were evaluated. Table 5-10 shows the total emissions below 914 meters (3,000 feet) for this proposed action in year 2008, the assumed worst-case year for emissions. Under Federal law, it would be necessary to conduct a conformity analysis for criteria pollutants that do not meet Federal attainment standards. Eastern Kern County is in serious non-attainment for ozone for Federal attainment standards. Therefore, if ozone precursors (VOC or NO_x) were above certain de minimis levels per year, it would be necessary to conduct a conformity analysis. Air analyses as shown in Table 5-10 indicate that NO_x and VOC emissions are 0.01 metric tons (0.01 tons) per year and 2.2 metric tons (2.4 tons) per year respectively. These wound not be above the de minimis level of 45.4 metric tons (50 tons) per year. Also, as demonstrated in Table 5-10 the total emissions from the proposed action represent 0.0001 percent of the area's emissions inventory for NO_x and 0.05 percent of the area's emissions inventory for VOC. These data demonstrate that the emissions are not regionally significant (i.e., do not equal or exceed 10 percent of regional emissions inventory for the air quality control area for any criteria pollutant). Based on both of these threshold tests, there is no need for a Federal conformity analysis. None of the emissions are expected to expose the nearby population or sensitive receptors to substantial pollutant concentrations. Also, the emission products should not expose the population to objectionable odors of types that do not already exist from airport operations (e.g., fuel and exhaust odors).

Table 5-10. Air Emissions Below 914 meters (3,000 feet) from Proposed Action in 2008 (both Concept A and B)

Emission Activities	CO_2 kilograms (pounds)	CO kilograms (pounds)	NO_x kilograms (pounds)	VOC kilograms (pounds)	PM kilograms (pounds)	H_2O kilograms (pounds)	SO_x kilograms (pounds)
Launch	14,447 (31,850)	6,122 (13,496)	3.3 (7.3)	29 (63)	68 (150)	8,845 (19,500)	1.7 (3.7)
Truck	-	9.1 (20)	9.5 (21)	1.5 (3.3)	0.7 (1.6)	-	-
Fueling	-	-	-	1,798 (4,818)	-	-	-
Total	14,447 (31,850)	6,131 (13,517)	13 (28)	2,215 (4,884)	69 (152)	8,845 (19,500)	1.7 (3.7)
Total metric tons/year (tons/year)	14.4 (15.9)	6.2 (6.8)	0.01 (0.01)	2.2 (2.4)	0.07 (0.08)	8.9 (9.8)	0.002 (0.002)
Comparison Against Regulatory Threshold Screening Tests							
Test 1 - Regulatory De Minimis Thresholds metric tons/year (tons/year)	-	-	45.4 (50.0)	45.4 (50.0)	-	-	-
Test 2 - Percent of Regional Emissions*	-	5 %	0.0001%	0.05%	0.6%	-	-

*Percent is 100 times the emissions of NOx and VOC from proposed action divided by the regional inventory of emissions - data on inventory emissions are those reduced emissions since 1990 from KCAPCD, 2000. For CO and PM, emissions from the proposed action were compared against current emissions from airport operations only (see Affected Environment). Actual percent of CO and PM would be much less if compared against the full inventory of emissions in the region.

The General Conformity Threshold Rates for NO_x and VOC for severe non-attainment areas is 50 tons per year. The actual emissions below 914 meters (3,000 feet) from the Proposed Action are 0.01 metric tons (0.01 tons) per year for NO_x and 2.2 metric tons (2.4 tons) per year for VOC. Therefore, there would be no exceedances of the NAAQS from the proposed action and a NAAQS assessment is not required to evaluate for the potential for significant air quality impacts under NEPA. (FAA/USAF, 1997)

Air Emissions above 914 meters (3,000 feet). To determine potential environmental impacts of emissions (e.g., global warming, ozone depletion, etc), emissions above 914 meters (3,000 feet) were examined. Table 5-11 shows the total emissions above 914 meters (3,000 feet) for the proposed action. There are no pollutants that contribute to ozone depletion. The greenhouse effect (or global warming) occurs when energy re-radiated from the Earth is trapped by gases in the Earth's atmosphere. Greenhouse gases include water vapor, CO_2, ozone, and chlorofluorocarbons. CO and NO_x are not greenhouse gases, but can contribute indirectly to the greenhouse effect. The total CO_2 emissions for the proposed action are approximately 103 metric tons (113 tons) in the assumed worst-case year 2008. In comparison, CO_2 emissions in the PEIS for Licensing Launches (DOT, 2001) from commercial launches were estimated to be much more than the proposed action (approximately 4,536 metric tons per year (5,000 tons per year)).

Table 5-11. Air Emissions (pounds) Above 3,000 feet from Proposed Action in 2008 (both Concept A and B)

Emission Activity	CO_2 kilograms (pounds)	CO kilograms (pounds)	H_2O kilograms (pounds)
Launch	102,514 (226,004)	43,558 (96,030)	64,607 (142,433)
Total tons/year	51 (113)	22 (48)	32 (71)

The CO_2 emissions cited in the PEIS (DOT, 2001) were determined to be insignificant. Further, the CO_2 emissions from all sources in the U.S. totaled 5,159 million metric tons (5,687 million tons) in 1994. The proposed action represents a very small fraction (less than 0.000002%) of these CO_2 emissions. Consequently, the CO_2 emissions from the proposed action would be insignificant.

The total water vapor generated from both Concept A and Concept B launches is estimated to be approximately 64 metric tons per year (71 tons per year) in 2008. In comparison, water vapor emissions from commercial launches were estimated the PEIS of commercial launches of expendable launch vehicles (DOT, 2001) to be much more than the proposed action (approximately 1,814 metric tons per year (2,000 tons per year)). The water vapor emissions in the PEIS (DOT, 2001) were determined to be insignificant. The total carbon-equivalent direct and indirect emissions effects in the U.S. were 1,665 metric tons (1,835 million tons). Water vapor would have an insignificant effect on global warming.

5.1.2 Alternative 1

Since the proposed action (both Concept A and B operations) would not have significant air impacts, alternative 1 (Concept A operations only) would also be expected to not have any significant air impacts.

5.1.3 Alternative 2

Since the proposed action (both Concept A and B operations) would not have significant air impacts, alternative 2 (Concept B operations only) would also be expected to not have any significant air impacts.

5.2 Airspace

This section describes any significant impacts to airspace that might occur as a result of the proposed action and alternatives. A significant impact to airspace would be the operation of a vehicle in airspace not approved for the activity, an increase in the probability of an in-flight mishap, a permanent change to military training routes, an interference with en route airways and jet routes, or a restriction of operations at surrounding airports.

5.2.1 Proposed Action

On Site

No significant impacts to Mojave Airport airspace would occur as a result of the proposed action. The maximum number of flights in any single year would be 56 under the proposed action. The Mojave Airport currently averages 18,301 flights per year and is operating at only three percent capacity. (Kern County, 2003c) An additional 56 operations per year would represent an increase in activity of 0.3 percent. This increase would not exceed the capabilities of the Mojave Airport facilities and control tower and would not result in a significantly higher probability of in-flight mishaps. The Mojave Airport currently serves aircraft similar in size and power to the proposed vehicles. Thus, the Mojave Airport airspace would be appropriate for the proposed action. No military training routes, en route airways, jet routes or surrounding airport airspaces intersect the Mojave Airport airspace.

Off Site

No significant impacts to off-site airspace would occur as a result of the proposed action. The proposed action would occur almost exclusively in the R-2508 Complex. The Mojave Airport and several of its tenants have LOAs with the R-2508 Complex Control Board and the managers of individual restricted areas within the R-2508 Complex to operate within the various individual restricted areas as discussed in Sections 3.3 Airspace and 4.1.1 Airspace and Air Traffic. A statement of authority in the LOAs declares that the "authority of the CCF, SPORT or TRACON, as appropriate, to approve or disapprove requests for entry is final." (LOA TRACON, 1996) The frequency and number of flights into the R-2508 Complex by Concept A and B vehicles would be ultimately controlled by the CCF, HI-DESERT TRACON, and SPORT. These scheduling and controlling agencies would coordinate any flight plans entering the R-2508 Complex using the procedures detailed in Section 4.1.1. Some short-term reductions in military training schedules could occur. However, any flights into the R-2508 Complex that are part of the proposed action that would create a significant impact to military activities would be prohibited by the scheduling and controlling agencies. Thus, the proposed action would not result in long-term changes to military operations or training within restricted airspace.

Four visual en route airways are located at the very southeastern portion of the ROI. (Maps.com, 2003) These flight routes are outside of the R-2508 Complex and would only impact Concept B flight plans. The en route airway with highest operating altitude is V442 at 3,049 meters (10,000 feet) above MSL. The Concept B vehicle would be at an altitude of at least 60,976 meters (200,000 feet) above MSL at the point of lateral intersection and would have sufficient vertical separation from the visual en route airways. No permanent changes to flight routes would result from the proposed action.

The airspace over all charted airports in the R-2508 Complex, other than the Mojave Airspace, extends from the surface to an altitude of 457 meters (1,500 feet) AGL. (Edwards AFB, 2003) The airport with the highest operating altitude outside of the R-

2508 Complex but within the ROI is Southern California Logistics in Victorville, California. Southern California Logistics' airspace extends from the surface to 1,646 meters (5,400 feet) above MSL. (Edwards AFB, 2003) The flight paths and trajectories of the proposed action would provide sufficient vertical separation from any surrounding public or private airport airspaces. Any emergency landings required by Concept A or B vehicles at surrounding airports would cause only temporary disruptions of airport operations. Due to the small size of the vehicles, in the unlikely event that a catastrophic failure of either a Concept A or B vehicle resulted in debris falling on a surrounding airport, the impact would cause minimal damage and would not constitute a significant impact. The proposed action would not affect operations and activities at the surrounding airports.

5.2.2 Alternative 1

Alternative 1 would have no significant impacts on airspace. Alternative 1 would consist of licensing the Mojave Airport to operate a launch site for Concept A vehicles only. A maximum of six flights of Concept A launch vehicles would occur per year. This would result in a 0.03 percent increase in activity at the Mojave Airport. Alternative 1 would use the same R-2508 Complex scheduling protocol as the proposed action and would have a smaller potential impact on surrounding airports because there would be fewer flights. Therefore, Alternative 1 would have less impact on airspace than the proposed action, which was determined would not affect airspace.

5.2.3 Alternative 2

Alternative 2 would have no significant impacts on airspace. Alternative 2 would consist of licensing the Mojave Airport to operate a launch site for Concept B vehicles only. A maximum of 50 flights of Concept B launch vehicles would occur per year. This would result in a 0.27 percent increase in airport activity. Alternative 2 would use the same R-2508 Complex scheduling protocol as the proposed action and Alternative 1. Alternative 2 would result in fewer flights per year than the proposed action and would have a smaller potential impact on surrounding airports. Therefore, Alternative 2 would have less impact on airspace than the proposed action, which was determined would have no impact on airspace.

5.3 Biological Resources

Impacts to biological resources would be considered significant if they resulted in harm, harassment, or destruction of any endangered, threatened, or rare species including a species proposed for listing, candidate species, or species considered sensitive in local or regional plans, policies, or regulations, or by the CDFG or USFWS. This would include interferences with the movement of native resident or migratory fish or wildlife species, migratory birds, established native resident or wildlife migration corridors, breeding areas, or the use of native wildlife nursery sites. The loss of a substantial number of individuals of any native plant or animal species that could affect abundance or diversity of that species beyond normal variability is also considered significant. Any impacts or modifications to designated critical or sensitive habitats, including riparian habitat or

other sensitive natural communities identified in local or regional plans, policies, or regulations, or by the CDFG or USFWS, would be considered significant.

Substantial adverse effects on Federally protected wetlands as defined by Section 404 of the Clean Water Act through direct removal, filling, hydrological interruption, or other means may be considered significant. Potential effects to biological resources also include conflict with local policies or ordinances protecting biological resources, such as a tree preservation policy, or conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

The Mojave Airport is located within an "urbanized, non-sensitive" area where a biological survey would not be required to support the proposed activities. (Kern County, 2003b)

5.3.1 Proposed Action

Vegetation

The proposed action would consist of launches and landings of Concept A and B launch vehicles from a designated runway at the Mojave Airport. The runways are routinely used for take-offs and landings by other aircraft, and no construction activities would be required to support Concept A and B launch operations. Because no development activities are planned, adverse effects to vegetation, including Joshua trees and creosote scrub, are not anticipated.

In the unlikely event of an emergency landing, the PIC would attempt to reach the primary abort site at the main runway at Edwards AFB. However, any airport within gliding range with a runway of at least 1,219 meters (4,000 feet) would be a candidate for an emergency landing location. For Concept A operations, the PIC would attempt to reach Rogers Dry Lake (also at one time known as Muroc Dry Lake), Edwards AFB main runway, or other appropriate airports. For Concept B operations, the PIC would attempt to reach Edwards AFB/Rogers Dry Lake, Boron Airstrip, or for the highest performance vehicles, Baker Airstrip or China Lake NAWS/China Dry Lake. If the PIC cannot reach any of the designated abort sites, he/she would attempt to land on one of the numerous regional dry lakes or in the area northeast of North Edwards, Boron and California City, including Rogers, Koehn, Harper, Cuddeback, Coyote, Soda, Bicycle, Silver, Leach, and Searles.

Rogers Dry Lake is routinely used for regular and emergency operations and resources are located in areas where they are unlikely to be impacted by landing on the lakebed. However, some small areas on Edwards AFB have been designated as significant ecological areas due to their unique resources. Other sensitive habitat regions include Harper dry lake, a unique alkali marsh community found at few other sites in the Mojave Desert. Sand sheets at the east edges of playas constitute habitat for desert cymopterus east of Cuddeback, Rogers, and Harper dry lakes. (Kern County, 2003a) Although the designated abort sites include areas where sensitive habitat and species may be present in

the surrounding areas, it is unlikely that an emergency landing would occur at these sites; therefore significant impacts to vegetation found at these sites would not be anticipated. If an emergency landing is made, the dry lakes are large enough to land an aircraft without impacting surrounding vegetation.

While not formally protected by any agency, creosote clonal rings may be a unique biological feature of the Mojave creosote scrub formation. The Mojave Specific Plan recommended that creosote clones be identified and documented. (Kern County, 2003b) The proposed action would not conflict with this recommendation, or with any other local policies or ordinances protecting biological resources.

Because Federally protected wetlands are not located at the Mojave Airport, adverse effects to these areas would not be anticipated. The proposed action would not have a substantial adverse effect on any riparian habitat or other sensitive natural community because such areas have not been identified on or near the airport.

Wildlife

The proposed action would use a designated runway at Mojave Airport for launches and landings of Concept A and B launch vehicles. The runways are routinely used for take-offs and landings of other aircraft, and no construction activities would be required to support Concept A and B launch operations. As a result, no loss of habitat is anticipated. The proposed action would not conflict with the provisions of any adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plans.

The Mojave Specific Plan identifies the Mojave Airport as part of an "urbanized, non-sensitive" area where a biological survey would not be required. The desert tortoise, a USFWS federally-listed, threatened wildlife species, and the Mohave ground squirrel, a California state listed threatened species, have historically occurred throughout the ROI and have limited potential to occur almost anywhere within the Mojave Specific Plan area. The Mojave Specific Plan indicated that the presence of desert tortoise individuals has not been reported recently. There is no critical habitat for the desert tortoise designated on the airport property. The USFWS has designated critical habitat for the desert tortoise within the ROI; however, nominal launch operations would not result in any impacts to designated areas of critical habitat. As a protective measure for desert tortoise that may be within the Mojave Airport fence, the FAA would survey the runway prior to take-off and landing of suborbital vehicles. (U.S. Department of the Interior, 2004) If a desert tortoise were discovered at the airport, personnel would follow appropriate USFWS and CDFG protocols. The FAA contacted the USFWS to initiate informal consultation under Section 7 of the Endangered Species Act. After review of potential impacts, the FAA determined and the USFWS concurred, that the proposed action is not likely to affect listed species or critical habitat. A copy of communication with the USFWS is included in Section 10.

Historically, the Mohave ground squirrel, a California state listed threatened species, likely occurred throughout the community of Mojave. Due to limited above ground

activity, it is difficult to assess the presence or absence of this species in Mojave. The Mojave Specific Plan indicated that there is limited potential for the Mohave ground squirrel to occur nearly anywhere within the region. (Kern County, 2003b) Although the Mojave Airport is located within the "urbanized, non-sensitive" area where a biological survey is not required, it is recommended that appropriate USFWS and CDFG protocols be followed if a Mohave ground squirrel were found on the site.

Because no construction activities are planned, no adverse effects, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species would not be anticipated.

The Mojave Specific Plan noted that historical wildlife movement corridors have been degraded by development. It is possible that mobile species may move between the Tehachapi foothills and dry lake playas. A biological survey to identify significant impacts to potential wildlife movement corridors would be required only for construction and development projects located in "non-urbanized, sensitive" areas. However, because the proposed action does not involve construction activities and the Mojave Airport is located within an "urbanized, non-sensitive" area, a biological survey for potential wildlife movement corridors in the ROI is not required. (Kern County, 2003b) The proposed action would not interfere substantially with the movement of any native resident or migratory wildlife species, or with established native resident or migratory wildlife corridors.

The breakup of Concept A or B vehicles during a crash and subsequent recovery activities could directly impact biological resources on- and off-site through ground disturbance. Also, if falling debris hit specific species on the ground, those resources would likely be destroyed. However, because the probability of a crash is low, impacts to biological resources as a result of vehicle crash would not be anticipated.

Concept A and B launch vehicles may cause sonic booms in the region, which could impact wildlife. Noise levels generated during sonic booms would be short-term in nature and overall predicted noise levels would not exceed ambient noise levels in residential areas. However, there is potential for C-weighted sound exposure levels above the acceptable threshold for ambient conditions, which is 61 dB. (Kern County, 2003c) The brief sonic boom noise could elicit a short-term startle response in wildlife but no long term adverse impacts are expected.

Concept A and B launch vehicles would fly east or north-northeast over regions of predominantly open land. For Concept A, the maximum number of launches would be six per year. Concept A launch vehicles would not fire rocket engines until the vehicle is approximately 15,240 meters (50,000 feet) above the ground and therefore the noise levels reaching the Earth's surface would be minimal. For Concept B, the maximum number of launches would be 50 per year. Concept B launch vehicles would fire rocket engines at the Mojave Airport and therefore the noise produced at the airport from these vehicles would be greater than the noise produced by Concept A launch vehicles. However, the noise level would be within the range of noises already produced by

aircraft at the Mojave Airport and therefore the launch of the launch vehicles would not produce noise levels in excess of those already experienced at the airport.

In general, these noise levels would be significantly less than those produced by existing aircraft in the region, would occur infrequently over the course of a year, and already occur as part of existing activities in the region, these short-term noise impacts would be less than significant. (DoD, 2002a)

The FAA requested a list of species listed, proposed, or identified as candidate species under the Endangered Species Act occurring in the ROI and whether critical habitat has been designated for these species. The USFWS provided a letter that included the requested list. After analyzing the proposed action and reviewing the list of species provided by the USFWS, the FAA determined that the proposed action would not adversely affect listed, proposed or species identified as candidate species, or critical habitat.

5.3.2 Alternative 1

The impacts to biological resources expected from Alternative 1 would be less than those described for the proposed action.

5.3.3 Alternative 2

The impacts to biological resources expected from Alternative 2 would be less than those described for the proposed action. However, because the total maximum number of launches of Concept B launch vehicles (50 launches per year) is significantly greater than Concept A launch vehicles (six launches per year), there is a greater risk of a crash impact to biological resources under Alternative 2 than under Alternative 1. Nevertheless, because the probability of a crash is still relatively low, impacts to biological resources in the region of influence under Alternative 2 as a result of a crash would not be anticipated.

5.4 Cultural Resources

Cultural resources are limited, nonrenewable resources whose potential for scientific research or value as a traditional resource may be easily diminished by actions that significantly impact the integrity of the property. Impacts to cultural resources are considered significant if the proposed action and alternatives result in a substantial change in the significance of a historic or archeological resource pursuant to Section 15064.5 of the CEQA Guidelines, or disturb any human remains, including those interred outside of formal cemeteries.

Potential impacts to historic properties are assessed by applying the Criteria of Adverse Effect. As defined in 36 CFR 800.5a, "an adverse effect is found when an action may alter the characteristics of a historic property that qualify it for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, workmanship, feeling, or association. Adverse effects may include reasonably foreseeable effects caused by the action that may occur later in time, be farther removed

in distance, or be cumulative." The Criteria of Adverse Effect provides a general framework for identifying and determining the context and intensity of potential impacts to other categories of cultural resources, as well, if these are present. Assessment of effects involving Native American or other traditional community, cultural or religious practices or resources requires focused consultation with the affected group. For the purpose of this EA, cultural resources include historic and Native American resources.

5.4.1 Proposed Action

No airport modifications or construction activities are currently planned to accommodate the proposed issuance of a launch site operator license to EKAD for the Mojave Airport. Potential impacts to cultural resources would be associated generally with the noise produced during flights and could include physical damage to buildings, structures or rock features through accident or vibration, visual or audible impacts to the setting of cultural resources, and disturbance of traditional activities, such as religious ceremonies or subsistence hunting. Impacts to cultural resources from airspace use would most likely be related to alterations in setting from visual or aural disturbance, and the extremely remote possibility of debris falling.

The proposed action would use a designated runway at Mojave Airport for launches and landings of Concept A and B vehicles. The runways are routinely used for take-offs and landings of other aircraft and no construction activities would be required. Because there are no sites listed or eligible for listing on the National Register within the community of Mojave and no construction activities would occur as part of the proposed action, no adverse effects on National Register sites would be anticipated.

In the unlikely event of an emergency landing, the PIC would attempt to reach a designated abort site. For both Concept A and B operations, the PIC has the option to land at Rogers Dry Lake (Muroc Dry Lake), which is a National Historic Landmark. The continued use of the landmark in assessing leading-edge space technology enhances its role in the history of technological advances in aviation and aerospace. There would be no adverse effects on this landmark. (DoD, 2002a) No other emergency abort sites in the ROI are designated cultural or historic sites.

The extent of archeological resources or potential impact to these resources cannot be determined without conducting a surface survey, and possibly, subsurface excavation. It is possible that the project area may contain unidentified cultural materials buried beneath the surface, which may be potentially impacted by future development. Should buried or otherwise hidden cultural resources be encountered at anytime on airport property, activities in the area of the discovery would be immediately halted and qualified archaeologists contacted to evaluate the find. Should any human remains be discovered within the project area, California law requires that there shall be no further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent human remains until the coroner of the county in which the remains are discovered is contacted to determine that no investigation into the cause of death is required. (Getchell and Atwood, Unpublished, 2003)

The breakup of the Concept A or B vehicles during a crash and subsequent recovery activities could directly impact cultural resources on the ground. These resources may be located above- or below- ground and may be known or unknown resources. If falling debris hit specific assets on the ground, those resources would likely be destroyed. Crash cleanup activities could also disturb nearby resources. However, because the probability of a crash is extremely low, and cultural resources are widely dispersed throughout the region, it is unlikely that debris would impact a cultural site.

The maximum number of launches for Concept A and Concept B would be six and 50 per year, respectively. Concept A and B launch vehicles may cause sonic booms in the region, which could impact prehistoric and historic resources. Noise levels and vibrations generated during sonic booms would be short-term in nature and overall predicted noise levels would not exceed ambient noise levels in Mojave. However, vibrations from the sonic booms could disturb existing cultural and historic structures, especially those that are not structurally sound.

Concept A and B launch vehicles will fly east or north-northeast over regions of predominantly open land. Although cultural and historic sites may be located in these regions, they are widely dispersed, and significant vibrations from the proposed action are not anticipated because the vehicles would operate at altitudes high above the Earth's surface.

The proposed action would not be expected to cause a substantial adverse change in the significance of a historical or archeological resource; directly or indirectly destroy a unique paleontological resource or site or unique geologic feature; or disturb any human remains within the ROI due to the low potential for accidents and small probability of vibration from sonic booms impacting widely dispersed resources. Because no cultural resources or Native American traditional activities have been identified on airport lands, adverse effects on Native American resources or disturbance of traditional activities would not be anticipated on airport lands. Pursuant to 36 CFR 800, the FAA requested the views of the SHPO on any further actions to identify historic properties or properties that may be listed in the National Register of Historic Places. Per the SHPO's recommendations, the FAA identified information on historic properties that are listed or are eligible for listing on the National Historic Register of Historic Places. Based on the FAA's review of the proposed action under Section 106 of the National Historic Preservation Act, the FAA determined that the project would have no adverse effect on historic properties. The SHPO concurred with the FAA's determination and the consultation was concluded. A copy of communication with the SHPO is included in Section 10.

5.4.2 Alternative 1

The impacts to cultural resources expected from Alternative 1 would be less than those described for the proposed action.

5.4.3 Alternative 2

The impacts to cultural resources expected from Alternative 2 would be less than those described for the proposed action. However, because the total maximum number of launches of Concept B launch vehicles (50 per year) is significantly greater than Concept A launch vehicles (six per year), there would be greater risk of a crash impact to cultural resources under Alternative 2 than under Alternative 1. Nevertheless, because the probability of a crash is still relatively low, impacts to cultural resources in the region of influence under Alternative 2 as a result of a crash would not be anticipated.

5.5 Geology and Soils

Impacts to geology and soils would be considered significant if the proposed action and alternatives resulted in exposure of individuals or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault; strong seismic ground shaking; seismic-related ground failure, including liquefaction; or landslides. Substantial soil erosion or loss of topsoil would be considered significant. Location of the ROI on a geologic unit or soil that is unstable, or that would become unstable, that would potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse, would be significant, while location on expansive soil would be significant if substantial risks to life or property were expected. Significant impacts also include soils that are incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available.

Impacts to hydrology would be considered if the proposed action and alternatives involved construction of housing or other structures within a 100-year flood plain, alteration of existing drainage patterns such that erosion or surface runoff increases substantially, or exposure of individuals and structures to a significant risk of loss, injury, or death involving flooding.

5.5.1 Proposed Action

Geology

The breakup of Concept A or B vehicles during a crash and subsequent recovery activities could directly impact geology. The force associated with falling debris may create craters. The specific impact to geology would depend on the force at which the debris impacts the ground. However, because the probability of a crash is extremely low, it is unlikely that debris or residual propellant would significantly impact geology.

Soils

The proposed action would have less than significant impacts or no impacts on soils. In terms of ground clouds from the combustion of propellants, Concept A would have no impacts because the only emission source at the ground level would be from the carrier aircraft. Concept A launch vehicles would not fire rocket engines until the vehicle reaches 15,240 meters (50,000 feet). Concept B launch vehicles would create a ground

cloud, which would disperse as the vehicle moves along the runway. Additionally, Concept B launch vehicles would use a liquid propellant, which creates a ground cloud with fewer impacts to soils than solid propellant motors.

The breakup of Concept A or B vehicles during a crash and subsequent recovery activities could directly impact soils. The force associated with falling debris might create craters. The specific impact to soils would depend on the force with which the debris impacts the ground. In addition, residual propellant in the damaged or destroyed launch vehicle could be absorbed by the soils affecting soil quality in the impact area. Because the probability of a crash would be low and cleanup of reportable quantities of hazardous material released required under CERCLA, debris or residual propellant would not be expected to significantly impact soils.

The take-offs and landings associated with the proposed action would not be located on unstable soil, nor would they create unstable soil. These activities would not be located on expansive soil and would pose no additional risk to life and property.

Mineral Resources

The proposed action would not result in a loss of known mineral resources or result in the loss of availability of a locally important mineral resource recovery site identified in a land use plan.

Seismicity

The proposed action would have no impact on existing seismic risk, including rupture of a ground fault, ground shaking and ground failure, including liquefaction.

Erosion

The proposed action would not change the ground surface and would have no impact on existing landslide and erosion risk.

Hydrology

Mojave has been historically subject to flash flooding. The most recent Federal Flood Insurance Study attributes flooding problems to poorly defined channels and obstructed and undersized culvert crossings. The majority of the population community of Mojave lies within the 100-year flood hazard plain. However, Mojave Airport is located outside the 100-year flood plain. Further, no construction activities are planned as part of the proposed action, no structures would be placed within the 100-year flood hazard map and thus construction activities would not impede or redirect flood flows.

5.5.2 Alternative 1

The impacts to geology and soils expected from Alternative 1 would be less than those described for the proposed action.

5.5.3 Alternative 2

The impacts to geology and soils expected from Alternative 2 would be less than those described for the proposed action.

5.6 Hazardous Materials and Hazardous Waste Management

Significant impacts from hazardous materials and hazardous waste management as a result of the proposed action and alternatives can be defined as

- Release during routine transport, use, or disposal of hazardous materials in an accident;
- Hazardous emissions or hazardous materials, substances, or waste handled within one-quarter mile of a school;
- Location of the ROI within an airport land use plan, within two miles of a public airport, or in the vicinity of a private airstrip, or on a hazardous materials site as designated by Government Code Section 65962.5;
- Interference with implementation of an emergency response or evacuation plan; or
- Increased risk of loss, injury, or death involving wild land fires.

5.6.1 Proposed Action

For both Concept A and B vehicles, the primary hazardous materials used would be propellants. As detailed below, the propellants used for Concept A launch vehicles are relatively inert as they would be stored at the airport. For Concept B, the kerosene and/or alcohol would have similar hazardous characteristics to the jet fuel currently used at Mojave Airport. In addition to propellants, for both Concept A and B, it is anticipated that minor amounts of other hazardous materials, such as paint, oils and lubricants, and solvents, would be used. All fuels and other hazardous materials would be stored, and used, in compliance with the regulations applicable to their storage and use, and already in place at Mojave Airport. No adverse impacts would be anticipated from these additional hazardous materials.

Concept A

Concept A launch vehicles would be fueled by a hybrid rocket motor using liquid N_2O and solid HTPB. Jet-A fuel would be used to fuel the carrier aircraft from takeoff on the ground until reaching 15,240 meters (50,000 feet) where the rocket motor would be ignited.

To compress gaseous N_2O to liquid form, a combination of elevated pressure and reduced temperature is needed. Specially designed storage tanks may be used for storing N_2O; one such design is the MONODS. The MONODS is described in greater detail in Section 4.2.1.

The HTPB solid propellant is manufactured and placed in a CTN motor offsite. The CTN would therefore arrive at the Mojave Airport fully fueled. The solid propellant is stable and non-reactive until ignited (e.g., combined with the oxidizer).

Concept B

LO_x and either kerosene or alcohol would be used as propellants in Concept B launch vehicles. Kerosene and alcohol are both interchangeable with Jet Fuel, which is already used without adverse impact at the Mojave Airport. LO_x would be stored in dewars (large cooled pressurized containers, with insulation to ensure that the oxygen remains in liquid form). For on-site storage, Concept B operators may lease tanker trucks to park on site in their operations area. Use of trucks located on site would give mobility for fueling, and avoid the overhead costs of tank construction. The potential for accidents related to this type of storage would need to be considered for any future specific proposals to store propellants in this fashion.

Concept B vehicles may also use either nitrogen or helium gas as control system gas. In the event of an engine fire, either nitrogen or helium would be released at high pressure into the engine to extinguish the flames. Nitrogen and helium would be stored on site in pressurized cylinders at the Mojave Airport.

Hazardous materials that would be used to support the operations associated with the proposed action are similar to materials already handled at the Mojave Airport and no changes in airport operations would be needed to accommodate them. For example, the site would not be required to apply for additional permits (e.g., under the Resource Conservation and Recovery Act [RCRA]). The transport, use, or disposal of hazardous materials would not create a significant hazard to the public or the environment. The Mojave Airport is located 2.3 kilometers (1.4 miles) from the nearest school and therefore hazardous materials related to the proposed action would not be used within 0.40 kilometers (0.25 miles) of an existing or proposed school. The Mojave Airport is not listed on the Department of Toxic Substances Control's Hazardous Waste Substances Site List, and the proposed action would not cause a significant hazard to the public or the environment. Overall, there would be no significant impacts anticipated from hazardous materials use or hazardous waste management.

5.6.2 Alternative 1

The impacts from hazardous materials and hazardous waste expected from Alternative 1 would be less than those described for the proposed action.

5.6.3 Alternative 2

The impacts from hazardous materials and hazardous waste expected from Alternative 2 would be less than those described for the proposed action.

5.7 Land Use

Significant impacts to land use as a result of the proposed action and alternatives are defined as physically dividing an established community, nonconformance with land use plans, conversion of prime farmland, unique farmland, farmland of statewide importance or other farmland to non-agricultural uses, conflicts with existing zoning for agricultural

use or Williamson contracts, deterioration of recreational facilities, or conflicts with environmental plans, goals, permit requirements, or existing uses.

5.7.1 Proposed Action

On Site

No significant impacts to land uses would occur as a result of the proposed action. The Kern County General Plan, the Mojave Specific Plan, the West Mojave Plan, and the Kern County ALUCP are the applicable land use planning documents for the Mojave Airport. The Mojave Airport is a highly developed, urbanized, non-sensitive area, and habitat and nature conservation plans are not applicable to the airport. The Kern County ALUCP has established PCC zones within the airport influence area. The PCC zones were developed in the airport influence area in consideration of the current and future activities of the airport, and have location, safety, development, and usage specifications. Because the proposed action would conduct horizontal launches and landings on established runways of vehicles similar in size, power, and noise level to aircraft already using the airport, there would not be a significant change in airport activities. All land uses and building restrictions in the PCC zones on the Mojave Airport would be maintained as defined in the Kern County ALUCP. The proposed action does not include any construction, additions, or modifications to the airport facilities that would be physically divide an established community. Therefore, the proposed action would not result in a conflict with an applicable land use, habitat conservation, or natural community conservation plan.

Agriculture Resources. No farmlands or agricultural use lands are located on the Mojave Airport. No prime farmland, unique farmland, farmland of state importance, or general farmland would be converted to a non-agricultural use as a result of the proposed action. No conflicts with existing agricultural uses or Williamson contracts would occur as a result of the proposed action.[12]

Recreation. No parks or recreational facilities are located on the Mojave Airport. The proposed action would not result in the physical deterioration of park or recreational facilities. The proposed action would not require the construction or expansion of recreational facilities that would have an adverse effect on the environment.

Off Site

No significant impacts to land uses in the off-site ROI would occur as a result of the proposed action. The applicable land use plans for the off-site ROI are the Kern County

[12] The California Legislature passed the Williamson Act in 1965 to preserve agricultural and open space lands by discouraging premature and unnecessary conversion to urban uses. The Act creates an arrangement whereby private landowners contract with counties and cities to voluntarily restrict their land to agricultural and compatible open-space uses. The vehicle for these agreements is a rolling term 10-year contract (i.e., unless either party files a "notice of non-renewal," the contract is automatically renewed for an additional year). In return, restricted parcels are assessed for property tax purposes at a rate consistent with their actual use, rather then potential market value. (California State Land Resource Protection, 2003)

General Plan, the Mojave Specific Plan, the West Mojave Plan, and the Kern County ALUCP. As discussed above, no significant changes to the airport activities would occur. The PCC zones would be maintained in the off-site airport influence area. The Concept A and B launch vehicles would use Runway 12-30, which serves large airline carrier jet aircraft and high performance military and non-military jet aircraft. This runway has a northwest-southeast orientation that routes aircraft over commercial, industrial, and resource management land uses, as defined by the Mojave Specific Plan, and away from sensitive land uses in the Mojave community such as residential areas and school areas. Because the proposed vehicles are similar in size, power, and noise level to the aircraft currently using the airport, any impacts on land uses in the Mojave community due to the proposed action would be equal to or less than the impacts of the existing activities. Noise impacts on sensitive land uses are discussed in Section 5.8.1. The proposed action would not include any off-site construction or modification of existing buildings or facilities, and therefore would not physically divide any established communities. No conflicts with any applicable land use plans or habitat or nature conservation plans for the Mojave community would occur as a result of the proposed action. Noise issues related to land uses are discussed in detail in Section 5.8.

Edwards AFB and China Lake NAWS conduct daily training flights in the R-2508 Complex using high performance military jets. These jets are similar in size, power, and noise level to the vehicles that would be used in the proposed action. Military rules for overflights of populated areas within the R-2508 Complex require a vertical separation of 914 meters (3,000 feet). The flight paths and trajectories of the Concept A and B launch vehicles would pass over any populated areas at an altitude well above 914 meters (3,000 feet) AGL. In addition, Edwards AFB has been an important test flight center for the development of the supersonic X-vehicles and NASA's Space Shuttle orbiter program. The AFFTC has also completed planning for a Western Approach Reentry corridor for unmanned LEVs. The LEVs would approach the Edwards AFB landing area from the west at supersonic speeds. While not yet used, this corridor is addressed in the *Environmental Assessment for the Orbital Reentry Corridor for Generic Lifting Entry Vehicle Landing at Edwards AFB* (December 2002). In the study document, the LEVs have been determined to not cause a significant impact on land uses in this area. Land use plans for the off-site ROI have been developed in consideration of these existing military and supersonic vehicle activities. Any impacts due to the proposed action would be equal to or less than the impacts from the existing military activities. Therefore, no significant impacts would occur as a result of the proposed action due to conflicts with environmental plans, goals, permit requirements, or existing uses.

Agricultural Resources. No significant impacts to agricultural resources in the off-site ROI would occur as a result of the proposed action. Because of the low precipitation, scarcity of ground water, and high temperatures, the off-site ROI has few farmland areas. The farmland areas in the Mojave community, already experience flyovers of aircraft similar in size, power, and noise level. Any impacts to agricultural resources in this area as a result of the proposed action would be less than the existing activities. Any farmlands in the ROI outside of the Mojave community are small acreage areas. The flight paths and trajectories of the Concept A and B vehicles would place the vehicles at least 6,098 meters (20,000 feet) above MSL at a distance of eight kilometers (five miles)

from the Mojave Airport. The vehicles would pass over any farmland areas at an altitude that would have no significant impacts. The proposed action would not cause the conversion of prime farmlands, unique farmlands, or farmlands of statewide importance to other non-agriculture uses.

The proposed action would not significantly impact grazing areas in the off-site ROI. Overflights of grazing areas at altitudes of 6,098 meters (20,000 feet) above MSL would have no significant impacts on existing agricultural land use. Any impacts to farmlands or grazing lands from a catastrophic accident would be insignificant due to the small size of the vehicles and the low probability of such a catastrophic event.

Recreation. No significant impacts to recreation areas in the off-site ROI would occur as a result of the proposed action. The launch of vehicles from the Mojave Airport would not change the existing land use and would not impact the preservation of the natural beauty of the countryside, public park, recreation lands, wildlife and waterfowl refuges, or historic sites as specified in Section 4(f) of the U.S. Department of Transportation Act of 1966. Parks and recreational facilities in the Mojave community already experience flyovers of aircraft similar in size, power, and noise level to the vehicles in the proposed action. Saddleback Butte State Park is located within the ROI; however, Concept A and B vehicles would pass over any parks and recreational facilities at an altitude that would have no impacts on the recreational area. The proposed action would not include construction or expansion of recreational facilities.

Many national and state parks, recreation areas, and conservation areas are located within the R-2508 Complex, however no overflight restrictions exist for those areas that lie within the ROI. The proposed Concept A and B launch vehicles would operate at altitudes significantly higher than those already used by current military test and training aircraft. (DoD, 2003a) The proposed Concept A and B launch vehicles operations would attempt to avoid these areas, and any flyovers of national parks, wilderness, recreational, and conservation areas would be at an altitude well above 914 meters (3,000 feet) AGL. Impacts to recreational areas from catastrophic accidents would be insignificant due to the small size of the vehicles and the low probability of such an event.

5.7.2 Alternative 1

Alternative 1 would have no significant impacts on land use. Alternative 1 would take place in the same ROI as the proposed action and would not involve any construction or expansion of facilities in the on- or off-site areas. The number of flights proposed for Alternative 1 would be fewer than those in the proposed action, so there would be fewer impacts than expected for the proposed action.

5.7.3 Alternative 2

Alternative 2 would have no significant impacts on land use. Alternative 2 would take place in the same ROI as the proposed action and would not involve any construction or expansion of facilities in the on-site or off-site areas. The number of flights proposed for

Alternative 2 would be fewer than those in the proposed action, so there would be fewer impacts than expected for the proposed action.

5.8 Noise

A significant impact may be a substantial (5 dB) change in noise level even though the magnitude of overall noise may be within land use compatibility. A non-significant impact would be an unsubstantial change in noise level even though the overall magnitude is greater than land use compatibility standards. Applicable noise standards for this proposed action would include

- State of California Building Code Part 2, Title 24 requires areas exposed to noise levels of 60 dB CNEL or greater to achieve an annual interior noise level of 45 dB CNEL through acoustical insulation measures;
- California's Land Use Compatibility for Community Noise Environments guidelines require a CNEL of 65 dB for exterior areas and 45 dB for interior areas for sensitive land uses; and
- The Kern County General Plan Noise Element, the Mojave Specific Plan, and the Kern County ALUCP require transportation noise sources to meet a 65 dB L_{dn} for exterior noise levels and a 45 dB L_{dn} for interior noise levels for areas with sensitive land uses.

Noise levels that exceed these standards or cause a substantial increase in noise level would be considered significant impacts. Other significant impacts would be the exposure of persons to excessive groundborne vibrations or noise levels, a substantial permanent or temporary increase in ambient noise levels in the ROI above current levels without the proposed action and alternatives, and the exposure of people residing or working in the airport area to excessive noise levels.

5.8.1 Proposed Action

The two launch vehicle concepts proposed for launch from the Mojave Airport use different launch methods. The following sections will describe the potential noise impacts associated with the different launch methods. Concept B launch vehicles may use two different types of engines.

Concept A

Concept A would consist of a carrier vehicle and a launch vehicle. The carrier vehicle would be powered by two afterburning J-85-GE-5 jet engines. The launch vehicle would be powered by a rocket engine using N_2O and HTPB. The carrier vehicle would transport the launch vehicle to an altitude of approximately 15,244 meters (50,000 feet) above MSL, and then release the launch vehicle. Once released, the launch vehicle would ignite its rocket engine and ascend at a maximum speed of Mach 3.5. The rocket engine would burnout before reaching the apogee of the flight and would coast unpowered to 100 kilometer (62.5 miles) above MSL. The carrier aircraft would return to the Mojave Airport under its own power and the launch vehicle would glide unpowered back to the Mojave Airport and land.

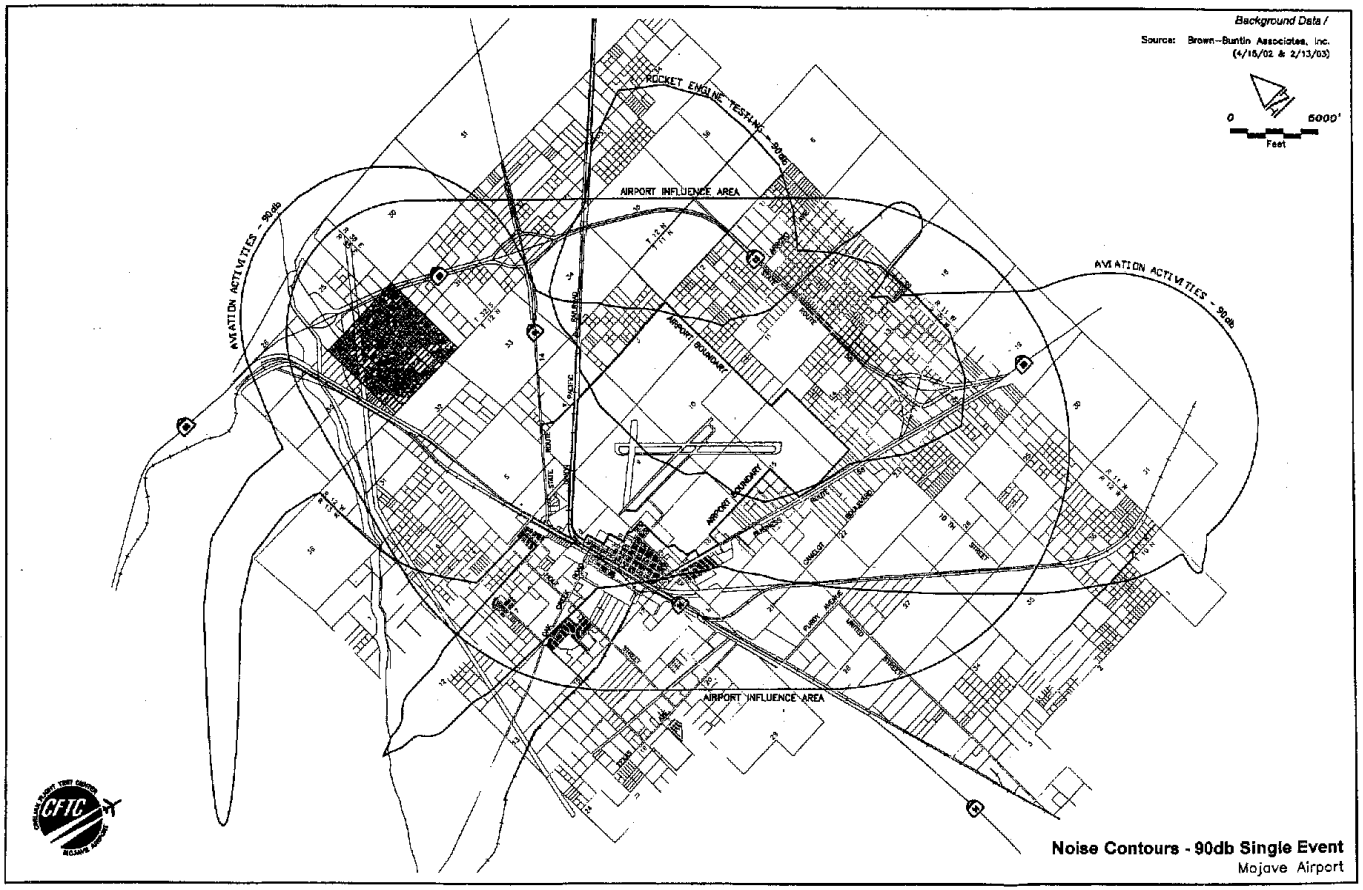
Concept B

Concept B launch vehicles would consist of a single stage rocket powered vehicle, powered by an engine fueled by a LO_x and kerosene or alcohol mixture. The vehicle would takeoff from the Mojave Airport and maneuver into a steep ascent reaching maximum speeds of almost Mach 4 at high altitudes. The engine would fire until the propellant is exhausted or the engine is turned off, and the vehicle would coast to apogee at or above 100 kilometers (62.5 miles) above MSL. The vehicle would then glide unpowered back to the Mojave Airport and land.

On Site

Engine Noise. No significant impacts to noise levels at the Mojave Airport would occur as a result of the proposed action. Approximately 1,226 jet aircraft takeoff and land at the Mojave Airport annually. (Kern County, 2003e) Of that, 713 are military jet aircraft, such as the F-4 and the Saab Draken. High performance, afterburning jet aircraft like the F-4 and the Saab Draken cause high intensity single event noise levels on the Mojave Airport. (Kern County, 2003d) Figure 5-1 shows a 90 dBA single event noise exposure level (SENEL) contour that encompasses the Mojave Airport when these aircraft takeoff. A SENEL is the level of noise accumulated during a single noise event with reference to duration of one second. (Kern County, 2003d) The SENEL is an appropriate measure for aircraft overflights. Because the Concept A carrier vehicle is a jet aircraft, it does not require a license from the FAA for its operation, and test flights on the vehicle have already begun. The jet engines of the carrier vehicle are similar in size and power to other aircraft that operate at the Mojave Airport. Noise levels at the airport from the Concept A carrier vehicle would be less than or equal to noise levels produced by afterburning jet aircraft currently using the Mojave Airport.

Figure 5-1. Map with 90 dBA SENEL for High Performance Aircraft at Mojave Airport



A USAF study showed that the Sound Exposure Level (SEL) for a T-38 aircraft (similar to the carrier aircraft for Concept A vehicles) would be 105.5 and the maximum A-weighted sound level for these aircraft would be 98.3 at a distance of 305 meters (1,000 feet). The SEL is a measure of the physical energy of the noise event which takes into account both intensity and duration. See Table 5-12 for the sound levels associated with various aircraft.

Table 5-12. SEL and Maximum A-Weighted Noise Levels for Various Aircraft

Aircraft Type	Sound Exposure Level (SEL)	Maximum Sound Level (L_{max})
Jet Bomber/Tanker/Transport		
B1B	123.5	118.3
B52G	121.5	113.9
B52H	112.2	105.2
C17	100.0	94.5
C5	113.5	106.3
C135B	106.6	101.9
C141	105.8	99.7
KC135A	117.8	109.1
KC135R	92.2	87.1
Other Jet Aircraft with Afterburners		
F4	115.7	109.7
F14	109.7	106.4
F15	112.0	104.3
F16	106.7	101.0
F18	116.9	108.0
FB111	108.1	102.3
T38	105.5	98.3
Other Jet Aircraft without Afterburners		
A6	112.3	108.3
A7	111.3	107.7
A10	96.9	93.2
C21	91.1	84.6
T1A	99.4	90.3
T37	97.7	91.0
T39	103.3	96.8
T43	100.8	94.1
Propeller Aircraft		
C12	79.3	73.2
C130	90.5	83.7
P3	96.8	91.0

Source: Federal Interagency Committee on Noise, 1992

Currently, two military jets takeoff and/or land at the Mojave airport on average each day. The proposed action, at a maximum, would launch and land 56 flights of Concept A

and B vehicles in 2008, or an average of 1.1 launches per week. Because the launch vehicle fires its rocket engine on the Mojave Airport, Concept B would have the largest potential for noise impacts at the Airport. Concept B flight procedures would occupy the Mojave Airport for four minutes during launch and four minutes during landing. Because landings of these vehicles would be unpowered, noise levels for the landing of the launch vehicle would be insignificant and will not be considered in this noise analysis. The takeoff time period includes positioning the vehicle on the runway and gaining clearance from the control tower prior to rocket ignition and the actual launch after rocket ignition. Conservative assumptions are that all launches would be Concept B vehicles, and that for the entire four minutes of launch time, the rocket engine is ignited. It is also assumed that all launches would occur during daylight hours (7 am to 7 pm). With approximately 1.1 launches per week at four minutes per launch, the Mojave Airport would be exposed to a total of 4.4 minutes of additional high intensity noise level per week. The total time of additional high intensity noise levels is likely overestimated due to conservative assumptions of launch vehicles and launch time periods. In addition, the noise source would be moving and the impacts to a particular location would only be a fraction of the total time.

The amount of noise produced by an engine is related to several factors including the thrust produced by the engine. The F-4 jet aircraft with afterburners used at the Mojave Airport has a thrust of 79,623 Newtons (17,900 pounds); this corresponds to a maximum A-weighted sound level of 109.7 at a distance of 305 meters (1,000 feet) (see Table 5-12). The Concept B vehicle proposed for launch from the Mojave Airport between 2005-2008 would have a maximum thrust of 8,010 Newtons (1,800 pounds), which is significantly lower than the thrust of the F-4 jets currently flown at the airport. It is therefore anticipated that the noise levels produced by the launch of the Concept B launch vehicle would be lower than the noise levels produced by aircraft already in use at the Mojave Airport. Because the Mojave Airport currently experiences high intensity noise levels due to military jet flights and stationary rocket testing, and because the additional high intensity noise level would be insignificant, impacts to noise levels during launches at the Mojave Airport would be insignificant.

Another high intensity noise source at the Mojave Airport is stationary rocket testing. Aerospace companies based at the Mojave Airport periodically test experimental rocket engines. Rocket engine tests have been conducted for both Concept A and B launch vehicles. A noise assessment was conducted in 2002 to measure the potential impacts of rocket engine tests on the Mojave community. The worst-case assumption for the assessment was a rocket test of a 267,000 Newtons (60,000 pound) thrust engine. (Kern County, 2003d) Based on the assumption that the rocket engine test stand would be located northeast of Runway 8-26, the A-weighted noise levels produced by a 267,000-Newtons (60,000-pound) thrust engine were estimated to be in the range of 85-95 dBA in the Mojave community. The assessment found that no significant impacts would occur if mitigating factors such as test stand location and orientation were considered. (Kern County, 2003d)

Sonic Boom. When an object moves through the air, it causes pressure waves that displace the air to make room for the object like waves on the bow of a boat. (DoD, 2002a) However, when the object travels at speeds faster than sound, the pressure waves cannot keep up. This results in a shock wave when the air in front of the object is displaced and again when the object passes and the air recompresses to fill the void of the passing object. (DoD, 2002a) The noise the shock wave creates is called a sonic boom. Sonic booms have no warning and are highest in intensity directly over the flight path. Sonic booms are measured as overpressure in kilograms per square meter (pounds per square foot) and can cause damage on the ground such as cracking plaster and breaking glass. (DoD, 2002a) A study of sonic booms found that 23 panes of glass out of 1,000,000 would break at 4.88 kilograms per square meter (1 pound per square foot) when located directly perpendicular to the flight path of an aircraft moving at supersonic speed. (DoD, 2002a) An overpressure of 4.88 kilograms per square meter is equivalent to a 90.9 dBA SENEL. (DoD, 2002a) The Concept A and B launch vehicles proposed for launch from the Mojave Airport would reach supersonic speeds.

Generic unmanned lifting vehicles are orbital vehicles that reenter at supersonic speed and land at Edwards AFB. These vehicles are similar in size to the proposed Concept A and B launch vehicles. The predicted overpressure for sonic booms produced by Concept A and B vehicles flying at approximately 21,341 to 24,390 meters (70,000 to 80,000 feet) above MSL would be approximately 5.86 kilograms per square meter (1.2 pounds per square foot) at ground level. (DoD, 2002a) The overpressure levels measured during the Space Shuttle flights landing at Edwards AFB were less than 9.76 kilograms per square meter (less than 2 pounds per square foot). (DoD, 2002a) Overpressure values similar to those predicted for the unmanned lifting vehicles would be expected for launches of Concept A and B vehicles from the Mojave Airport.

Launches from the Mojave Airport would only occur during daytime hours. As a previous DoD study has shown, the noise effects of 10 daytime sonic booms at an overpressure of 4.88 kilograms per square meter (1 pound per square foot) everyday for a year would yield an outdoor accumulated noise level equal to an L_{dn} of 65 dBA. (DoD, 2002a) This result aids in defining the maximum allowance for the number of daytime sonic boom events per day (10 events per day) to reach the L_{dn} 65 dBA noise standard limit. This assumes the estimated sonic boom overpressure is within the same order of magnitude, 4.88 kilograms per square meter (1 pound per square foot), as those to be generated by the proposed Concept A and B vehicles.

The L_{dn} of 65 dBA is the accepted outdoor noise level related to transportation that has been adopted by the State of California and Kern County. In addition, a CNEL noise standard of 65 dB, applied for sensitive land uses such as residential and school areas, is also a required noise standard by the local authorities. Note the L_{dn} is similar to CNEL. Both measures are the average noise level over a 24-hour period, yet each applies a separate variation on penalties for nighttime noises. L_{dn} adds a 10 dB penalty for noises occurring between 10 pm and 7 am the following morning. CNEL adds a 5 dB penalty to noises occurring between 7 pm and 10 pm and adds a 10 dB penalty to noises occurring between 10 pm and 7 am the following morning. (Kern County, 2003d)

However, the current proposed action would occur only during daytime hours. With no nighttime decibel penalties applicable, the L_{dn} and the CNEL measurements would be equivalent. As a result, an L_{dn} of 65 dBA for 10 daytime sonic booms per day for a year would be equivalent to a CNEL of 65 dBA for the proposed conditions.

Under the proposed action, it is expected the maximum overpressures would be on the order of 4.88 kilograms per square meter (1 pound per square foot), yet operations would occur at a lower frequency number of events (only 1.1 sonic booms per week). Therefore, the sonic boom noise impacts of the proposed action is estimated to be below the accepted L_{dn} and CNEL 65 dBA noise limits given the approximate factor of sixty-four times fewer expected number of sonic boom events estimated. At present, the Mojave Airport currently experiences sonic boom noise exposure from supersonic military jets and supersonic Space Shuttle testing at Edwards AFB.

Exposure to Humans. Occupational Safety and Health Administration (OSHA) regulation 1910.95 establishes a maximum noise level of 90 dBA for a continuous eight-hour exposure during a working day and higher levels for shorter exposure time in the workplace. The relationship allows for a 5 dBA increase in sound level for a 50 percent reduction in exposure time. Applying this, the effect is a continuous function up to a limit of 115 dBA, which is generally considered the sound level at which humans will experience pain. Under OSHA regulation 1910.95, exposure to impulse or impact noise should not exceed 140 dBA peak sound pressure level. The 140 dBA level is advisory rather than mandatory.

Launches are relatively short events and would be expected to occupy the airspace over the Mojave Airport for less than four minutes per launch. Therefore, workers at the airport would not be exposed to high noise levels for long periods of time due to launch events. In addition, the noise levels would quickly attenuate as the vehicle moves away from the launch point and therefore workers would not be exposed to the highest sound levels for all four minutes of the launch event. Personnel at the airport may be required to wear hearing protection to minimize their exposure to loud noises during launch events.

Increases in noise levels at the Mojave Airport as a result of the proposed action would be insignificant. The proposed action would not expose persons to or generate noise levels in excess of standards established by the California State Building Code, the California Land Use Compatibility for Community Noise Environments guidelines, the Kern County General Plan, the Mojave Specific Plan, or the Kern County ALUCP. The proposed action would not expose persons to or generate groundborne noise levels. The proposed action would not result in a substantial permanent or temporary increase in ambient noise levels in the Mojave Airport vicinity.

Off Site

No significant impacts to noise levels in the off-site ROI would occur as a result of the proposed action. The main areas of the Mojave community are located to the east of the Mojave Airport. The Mojave community currently experiences high noise levels from

military jet takeoffs and landings and stationary rocket tests. Sensitive receptors in the Mojave community such as schools and residential areas already experience high intensity noise levels above 90 dBA. An additional 4.4 minutes per week of high intensity noise levels would not cause significant impacts to sensitive receptors and would not elevate the average noise level above the acceptable levels of 65 CNEL or 65 L_{dn}. (Kern County, 2003c)

The additional noise level associated with the launches of the Concept A and B vehicles would be an insignificant increase to the community. The noise levels in the Mojave community associated with sonic booms would be less than 65 dBA L_{dn} and less than 65 dBA CNEL. The entire Mojave community including sensitive receptors currently experiences sonic boom noise exposure from air- and spacecraft landing at Edwards AFB. The proposed action would not constitute a significant increase in noise level to the community.

There are three concerns regarding sonic boom effects on humans including health, startle, and annoyance. To put these concerns into perspective, Table 5-13 presents overpressures and common noise sources. In the expected overpressure range for the proposed activities, 1.2 pounds per square foot, a pile driver at a construction site would be an equivalent noise source.

Table 5-13. Typical Sonic Boom Overpressure Ranges and Equivalents

Overpressure (pounds per square foot)	Common Equivalent
0.5 – 2	Pile driver at construction site
2 – 4	Cap gun or firecracker near ear
4 – 10	Handgun as heard at shooter's ear
10 – 14	Fireworks display from viewing stand

Annoyance created by sonic booms is a function of boom intensity, number of booms per time period, attitude of the population, and the activity in which people were engaged in at the time of the boom. There is no precise relationship between the parameters. A noise study found that 10 percent of subjects exposed to 10 to 15 booms per day were annoyed at an overpressure of one pound per square foot and that this reached nearly 100 percent at three pounds per square foot. However, people may be more sensitive when exposed to numerous booms per day, while prior experience with sonic booms (such as people who live on an Air Force Base) seems to lower sensitivity. Other studies indicate that there is a wide range in estimating percent annoyed ranging from 10 percent to 70 percent at one pound per square foot and 55 percent to approximately 100 percent at three pounds per square foot.

The off-site areas of the ROI outside of the Mojave community would be almost entirely in the R-2508 Complex. The R-2508 Complex was developed explicitly for military operations involving the testing and training of supersonic aircraft and spacecraft. The area is exposed to regular aircraft overflight noise and sonic booms on a daily basis. While national and state parks, recreation areas, wilderness areas, and conservation areas are located within the R-2508 Complex no overflight restrictions exist for those within

the ROI. The proposed Concept A and B launch vehicles would operate at altitudes significantly higher than those already used by current military test and training aircraft. The proposed action would have no significant noise level impacts on national parks, wilderness areas, or populated areas in the R-2508 Complex.

Flights operating to the southeast outside of the R-2508 Complex would be at an altitude of at least 60,976 meters (200,000 feet) above MSL. At this altitude, the unmanned lifting vehicle was predicted to create sonic boom overpressures of approximately 1.46 kilograms per square meter (0.3 pounds per square foot) at ground level. (DoD, 2002a) The proposed vehicles would create similar ground level overpressures while operating at the same altitudes. No impacts to noise level in the areas outside of the R-2508 Complex would occur as a result of the proposed action.

An EPA review of available data on noise reduction or attenuation provided by typical building construction indicated that average residential construction provides sound attenuation of approximately 15 dB with windows open and 25 dB with the windows closed. Houses in warm climates typically provide lower than average attenuation (12 and 24 dB, respectively), while houses in cold climates provide greater attenuation (17 and 27 dB, respectively). Based on the average attenuation values, an interior noise level of 60 dB would correspond to exterior levels of 75 dB (windows open) and 85 dB (windows closed). Depending on the construction materials and methods, schools and commercial buildings may provide greater noise attenuation, particularly with the windows closed. (Federal Interagency Committee on Noise, 1992) Therefore sound levels experienced inside buildings during launch events would be less than the noise experienced outside during these events. People living and working within two miles of the Mojave Airport would not be exposed to excessive noise levels.

No significant impacts to noise levels in off-site areas would occur as a result of the proposed action. The proposed action would not expose persons to or generate noise levels in excess of standards established by the California State Building Code, the California Land Use Compatibility for Community Noise Environments guidelines, the Kern County General Plan, the Mojave Specific Plan, or the Kern County ALUCP. The proposed action would not expose persons to or generate groundborne noise levels. The proposed action would not result in a substantial permanent or temporary increase in ambient noise levels in the off-site ROI vicinity. The proposed action would not expose people residing or working in the area of the Mojave Airport to excessive noise levels.

5.8.2 Alternative 1

Alternative 1 would have no significant impacts on noise levels. Alternative 1 would consist of Concept A, which would involve a maximum of 6 flights per year. The carrier vehicle is of similar size and power to aircraft currently using the airport and has already begun test flights. Sonic boom overpressures from the launch vehicle would not occur below 15,244 meters (50,000 feet) above MSL. Sonic booms are an existing condition in the ROI and Alternative 1 would not cause a substantial increase in noise levels. Therefore, Alternative 1 would have less impact on noise levels than the proposed action.

5.8.3 Alternative 2

Alternative 2 would have no significant impacts on noise levels. Alternative 2 would consist of Concept B, which would involve a maximum of 50 flights per year. Stationary rocket tests of the proposed Concept B vehicle have already taken place at the Mojave Airport, and the airport currently experiences high intensity noise levels from military jet aircraft. The maximum sonic boom overpressures from the launch vehicle would be approximately 5.86 kilograms per square meter (1.2 pounds per square foot). This is similar to overpressures from vehicles currently operating in the ROI. Sonic booms are an existing condition in the ROI and Alternative 2 would not cause a substantial increase in noise levels. Therefore, Alternative 2 would have less impact on noise levels than the proposed action.

5.9 Socioeconomic Impacts and Environmental Justice

Socioeconomic Impacts

Socioeconomic impacts, including impacts to population, housing, employment would be considered significant if they substantially altered the location and distribution of the population within the ROI; caused the population to exceed historic growth rates; decreased jobs so as to substantially raise the regional unemployment rates or reduce income generation; substantially affected the local housing market and vacancy rates; or resulted in the need for new social services and support facilities.

Infrastructure

An impact to infrastructure would be considered significant if it resulted in a change in the growth and transportation planning, rural public transportation planning, and development review of the region.

Other Services

An impact to public and emergency services would be considered significant if it resulted in slower response times by fire protection services, security services, or medical services, or failure of these services.

Environmental Justice

The Environmental Justice Interagency Working Group, mandated by Executive Order 12898, developed guidance for determining whether an impact to human health or the environment would result in disproportionately high and adverse impacts to minority and/or low income populations. The Working Group recommends considering the following six factors to the extent practicable.

1. Whether there is or will be an impact on the natural or physical environment that significantly and adversely affects a minority or low-income population. Such effects may include ecological, cultural, human health, economic, or social impacts on

minority communities or low-income communities when those impacts are interrelated to impacts on the natural or physical environment.

2. Whether environmental effects are significant and are or may be having an adverse impact on minority populations that appreciably exceeds or are likely to appreciably exceed those on the general population or other appropriate comparison group.

3. Whether the environmental effects occur or would occur in a minority and/or low-income population affected by cumulative or multiple adverse exposures from environmental hazards.

4. Whether the health effects, which may be measured in risks and rates, are significant, or above generally accepted norms. Adverse health effects may include bodily impairment, infirmity, illness, or death.

5. Whether the risk or rate of hazard exposure by a minority population or low-income population to an environmental hazard is significant and appreciably exceed or is likely to appreciably exceed those on the general population or other appropriate comparison group.

6. Whether health effects occur in a minority population or low-income population affected by cumulative or multiple adverse exposures from environmental hazards

5.9.1 Proposed Action

Population

Since no new development would be required to support the proposed action, and only existing personnel would be used to conduct launch activities, the proposed action would not induce substantial population growth in the community of Mojave. The proposed action would not be expected to displace people or decrease the population in the community of Mojave and therefore no impacts to population are expected from the proposed action.

Employment

The proposed action would not require new construction or create new employment positions at the Mojave Airport. The proposed action would not result in any jobs being eliminated at the Mojave Airport and therefore no impacts to employment are expected from the proposed action.

Income

The proposed action would not result in the elimination of any jobs and therefore would not have any negative impacts on the community of Mojave. Any increase in the number of people accessing Mojave as a result of the proposed action would be limited to launch

participants and launch spectators. These visitors would most likely spend only one day in Mojave to watch or participate in launches. It was assumed that each launch of Concept A and B launch vehicles would add three passenger vehicles to the area and each vehicle would contain one to two people. The maximum number of flights for Concept A would be six launches per year, which would add 18 passenger vehicles to the area per year. The maximum number of flights for Concept B would be 50 flights a year, which would add 150 passenger vehicles to the area per year. Because these visitors would only be spending a short amount of time in Mojave, they are not expected to impact the local service industry. Therefore, there would be no impact to the community of Mojave from the proposed action.

Housing

The proposed action would not displace people from their existing housing or bring an influx of people to the region to seek housing thereby necessitating the construction of housing elsewhere. Since the proposed action would not result in an increase or decrease in the demand for housing in the region, no impacts to housing are expected from the proposed action.

Infrastructure

As mentioned previously, the maximum number of flights for Concept A would add 18 passenger vehicles to the area per year and the maximum number of flights for Concept B would add 150 passenger vehicles to the area per year. Existing roads could easily handle this level of passenger traffic and therefore additional transportation infrastructure would not be required.

The proposed action and alternatives would not result in substantial adverse physical impacts associated with the provision of or need for new or physically altered government facilities, to maintain acceptable service ratios, response times or other performance objectives for any of the public services.

Other Services

Since the proposed action does not involve an influx of workers to the Mojave Airport, under normal launch and landing procedures, additional on- or off-site public or emergency services, including firefighters, security, or medical services would not be required.

Environmental Justice

Since no construction activities would be required to issue a launch site operator license to EKAD for the Mojave Airport and only existing personnel would be used to conduct launch activities, the proposed action would not have an impact on the health or environment of minority or low-income populations located at or near the airport.

Both Concept A and Concept B launch vehicles could cause sonic booms, which could impact local communities, including environmental justice groups. Noise levels generated during sonic booms would be short-term in nature and overall predicted noise levels would not exceed ambient noise levels in residential areas. However, there is the potential for C-weighted sound exposure levels above the acceptable threshold for ambient conditions, which is 61 dB. The brief sonic boom noise could elicit a short-term startle response in humans. The maximum number of launches for Concept A and Concept B would be six and 50 per year, respectively.

Currently, aircrews flying within the R-2508 Complex are required to maintain a minimum altitude of 914 meters (3,000 feet) above ground level over populated areas such as small towns and recreation areas. (Edwards AFB, 2003) Concept A and B launch vehicles will fly east or north-northeast over regions of predominantly open land. Significant noise impacts by the proposed action would not be anticipated because the vehicles would operate at altitudes high above the Earth's surface. Also, because these noise levels would be significantly less than those experienced by existing vehicles in the region, would occur infrequently over the course of a year, and already occur as part of existing activities in the region, these short-term noise impacts would be less than significant for environmental justice communities. (DoD, 2002a)

5.9.2 Alternative 1

The socioeconomic and environmental justice impacts expected from Alternative 1 would be less than those described for the proposed action.

5.9.3 Alternative 2

The socioeconomic and environmental justice impacts expected from Alternative 2 would be less than those described for the proposed action.

5.10 Transportation

This section focuses on the impacts of vehicular traffic from the proposed action on the existing roadways. Significant impacts to transportation as a result of the proposed action and alternatives can be defined as

- Substantial increase of traffic relative to the existing traffic load and capacity of the street system,
- Exceeding a level of service standard established by the county congestion management agency for designated roads or highways,
- Alteration of air traffic patterns,
- Substantial increase of hazards due to a design feature or incompatible uses,
- Inadequate emergency access or parking capacity, and
- Conflict with adopted policies, plans, or programs supporting alternative transportation.

5.10.1 Proposed Action

Passenger Vehicles

Under the proposed action, no additional employees would be hired by the Mojave Airport, or Concept A or B companies. Any increase in the number of passenger vehicles accessing Mojave would be limited to launch participants and launch spectators. It was assumed that three vehicles would be added to the area for each launch of Concept A and B launch vehicles. The maximum number of flights for Concept A would be six launches per year, which would add 18 passenger vehicles to the area per year. The maximum number of flights for Concept B launches would be 50 flights a year, which would add 150 passenger vehicles to the area per year.

Existing access roads could easily handle this level of passenger vehicle traffic without a change in LOS designation or a significant change in the volume to capacity ratio. The proposed action would not result in inadequate emergency access or parking capacity at the Mojave Airport or within the Mojave community. The proposed action would not conflict with adopted plans, policies, or programs supporting alternative transportation.

Delivery Vehicles

Under the proposed action, additional propellants would be delivered to the Mojave Airport to support the flights of Concept A and B launch vehicles. For Concept A, propellants would consist of N_2O and HTPB for the launch vehicle and Jet-A fuel for the carrier vehicle. The amount of N_2O required for one launch is 1,295 kilograms (2,855 pounds). Each delivery truck would deliver 11,340 kilograms (25,000 pounds) of N_2O to the Mojave Airport. Under the proposed flight schedule, the maximum number of launches would be six per year; therefore one delivery truck per year would supply the required N_2O. The amount of Jet-A fuel required for one launch is 2,903 kilograms (6,400 pounds). Each delivery truck would deliver 28,122 kilograms (62,000 pounds) of Jet-A fuel to the Mojave Airport; therefore one truck a year would be needed to supply the required Jet-A fuel. One truck per flight would be needed to bring the motor CTN containing the solid propellant, HTPB, to the Mojave Airport; therefore six trucks per year would be needed to deliver the required HTPB. A maximum of eight delivery trucks would supply propellants for Concept A launch vehicles per year. Currently, the Mojave Airport estimates that 264 trucks deliver propellants annually. (Mojave Airport, 2003d) There would be no additional congestion or decline in LOS from the addition of delivery trucks for Concept A launches.

Propellants for Concept B launch vehicles include LO_x and kerosene or alcohol. Smaller Concept B vehicles would be launched in 2003 to 2008, while larger Concept B vehicles would be launched only in 2006 to 2008. For this analysis, the larger vehicle is used to estimate the worst-case scenario of additional delivery vehicles in 2006 to 2008. Thus, the actual number of delivery trucks needed for Concept B launches could be smaller. The amount of LO_x required for launching the larger Concept B vehicle is 3,402 kilograms (7,500 pounds). The amount of kerosene required for launching the larger Concept B vehicle is 1,361 kilograms (3,000 pounds). Each delivery truck would deliver

17,418 kilograms (38,400 pounds) of LO_x or 28,123 kilograms (62,000 pounds) of kerosene to the Mojave Airport. Therefore 12 delivery trucks per year would be needed to supply the required LO_x and three delivery trucks per year would be need to supply the required kerosene for Concept B launches. A total of 15 additional delivery trucks per year would be needed to support Concept B launches. Because the Mojave Airport currently has approximately 264 propellant delivery trucks per year, there would be no additional congestion or decline in LOS from the addition of delivery trucks for Concept B launch vehicles.

The Mojave Airport is located at the crossroads of major north-south and east-west roadways. The small number of additional passenger vehicles and delivery trucks anticipated as part of the proposed action would not increase traffic congestion or cause a decline in the LOS.

5.10.2 Alternative 1

The impacts to transportation expected from Alternative 1 would be less than those described for the proposed action.

5.10.3 Alternative 2

The impacts to transportation expected from Alternative 2 would be less than those described for the proposed action. However, because the total maximum number of launches of Concept B launch vehicles is greater than for Concept A launch vehicles, there would be a greater number of passenger vehicles and delivery vehicles associated with this alternative. However, this level of increased traffic is not expected to impact the existing LOS.

5.11 Visual and Aesthetic Resources

The proposed action can be analyzed with respect to two criteria, intensity and context. Intensity is measured by the estimation of visual dominance, and context is determined by the degree of visual sensitivity. Impacts to visual and aesthetic resources would be considered significant if the proposed action and alternatives resulted in a substantial adverse effect on a scenic vista; damaged scenic resources, such as trees, rock outcroppings, or historic buildings within a state scenic highway; degraded the existing visual character or quality of the site and its surroundings; or created a new source of substantial light or glare, which affected day or nighttime views in the region.

5.11.1 Proposed Action

The proposed action would have no significant visual impacts. As described in Section 3.12.1, impacts to visual and aesthetic resources are often considered in terms of visual dominance and visual sensitivity. The design of Concept A and B launch vehicles would resemble traditional airplanes while in flight, and the visual landscape already includes airplanes in flight. Furthermore, the proposed action would not create a new source of substantial light or glare to adversely affect day or nighttime views in the area, so the

visual dominance would be "Not Noticeable." Both Concept A and B launch vehicles would leave visual contrails, but they would be similar in visual impact to contrails from existing operations. Because this area is already used for takeoffs and landings of airplanes, the visual sensitivity is low. The proposed action would not substantially degrade the existing visual character or quality of the site and its surroundings and would have no adverse effect on a scenic vista or scenic resources, as there are none in the area.

5.11.2 Alternative 1

The impacts to visual and aesthetic resources expected from Alternative 1 would be less than those described for the proposed action.

5.11.3 Alternative 2

The impacts to transportation expected from Alternative 2 would be less than those described for the proposed action.

5.12 Water Resources

Significant impacts to water resources as a result of the proposed action and alternatives can be defined as

- Violations of surface water quality standards or waste discharge requirements,
- Alteration of drainage patterns to cause significant flooding or erosion,
- Construction or expansion of storm water drainage facilities,
- Construction of structures within a 100-year flood plain,
- Adverse effects on ground water quality or quantity,
- Need for new or expanded water supply entitlements, and
- Adverse effects on other utilities and service systems such as wastewater treatment and solid waste.

5.12.1 Proposed Action

On Site

No significant impacts to on-site water resources would occur as a result of the proposed action. The Mojave Airport facilities would be used in their present condition and for their current purposes. Because no construction or expansion to the existing facilities would occur, the proposed action would not cause impacts to existing drainage patterns that would result in increased erosion, siltation, or on-site flooding. The proposed action would not involve the generation of additional storm water or of additional sources of pollutants that could be washed away during storm events. The existing storm water system and permit would be adequate for the proposed action. In addition, no impacts would result from the proposed action due to inundation by seiche, tsunami, or mudflow. In the event of a catastrophic accident, debris and wreckage could impact drainage patterns or storm water flows. But, the small size of the proposed vehicles and the low probability of a catastrophic event would make the impacts insignificant. Extensive

emergency response and clean-up procedures would further reduce the magnitude and duration of any impacts.

Because no construction or expansion to the existing facilities would occur, the proposed action would not substantially deplete ground water supplies either on- or off-site or interfere with ground water recharge such that there would be a net deficit in aquifer volume or a lowering of the local ground water table. In the event of a catastrophic accident unspent propellant could impact ground water. However, the small size of the proposed vehicles and the low probability of a catastrophic event would make the impacts insignificant.

Off Site

No significant impacts to off-site water resources would occur as a result of the proposed action. Because no construction or expansion to existing off-site facilities would occur, the proposed action would not cause impacts to existing drainage patterns that would result in increased erosion, siltation, or off-site flooding. The proposed action would not involve the generation of additional storm water or of additional sources of pollutants that could be washed away during storm events. The proposed action would not make any changes to the amount of impermeable surface area and would therefore have no impact on the existing off-site storm water system. Therefore, the capacity of the current storm water system would be adequate to accommodate the proposed action. In addition, no impacts would result from the proposed action due to inundation by seiche, tsunami, or mudflow. In the event of a catastrophic accident, debris and wreckage could impact drainage patterns or storm water flows. However, the small size of the proposed vehicles, the low probability of a catastrophic accident, and the extensive emergency response and clean-up procedures in place at the airport, would make the impacts insignificant.

No impacts to surface water quality would occur as a result of the proposed action. The proposed vehicles would operate at high altitudes above surface water bodies and would not impact the quality of the water bodies. In the event of a catastrophic event, if a vehicle or debris from the vehicle were to land in a water body, potential water quality impacts could occur. However, the small size of the proposed vehicles, the low probability of a catastrophic accident, and the small amount of surface waters in the ROI would make any impacts insignificant.

No impacts to ground water would occur as a result of the proposed action. Because no construction or expansion to existing off-site facilities would occur, the proposed action would not substantially deplete ground water supplies either on- or off-site or interfere with ground water recharge such that there would be a net deficit in aquifer volume or a lowering of the local ground water table.

Utility and Service System Infrastructure

No significant increases in the need for utilities and service systems would occur due to the proposed action. The Mojave Airport is an existing facility in the Mojave community. The airport's growth and development has been anticipated in planning documents such as the Mojave Specific Plan and various utility Master Plans. The Mojave Airport currently operates at approximately three percent of the airport capacity. (Kern County, 2003e) The main activities at the airport include general aviation and test aircraft flights. Tourists visiting the Mojave Airport for reasons related to the proposed action would create a temporary increase in the demand for utilities and service systems at the facility. This temporary increase in demand would not have a noticeable impact on the utility infrastructure for the Mojave community. The off-site areas in the Mojave community are served by the same utilities and service systems as the Mojave Airport. No construction or expansion of off-site facilities would occur in the Mojave community, therefore there would be no significant increase in the demand for utilities or other service systems in the community.

The Mojave Specific Plan and the MPUD Master Water Plan recognize that water supplies are very limited. Surface water supplied by AVEK will likely decrease in the future, and MPUD's ground water wells and distribution systems are not adequate to meet the projected demand in 2020. (Kern County, 2003e) However, MPUD is developing an Urban Water Management Plan to address increasing water needs of the Mojave community including the Mojave Airport. This plan will help regulate urban development and water use to ensure a reliable water supply for the Mojave community. As an existing customer of the MPUD, the Mojave Airport's growth has been anticipated by the Mojave Specific Plan and the Master Water Plan and will be part of the Urban Water Management Plan. The proposed action would not significantly impact the water supplies of the MPUD. Sufficient water supplies are available from existing entitlements in the MPUD to serve the proposed action. Additionally, the proposed action would not deplete ground water supplies or interfere with ground water recharge causing a net deficit in aquifer volume which would result in an inability to support existing or permitted land uses.

The MPUD wastewater treatment plant is operating at approximately 66 percent capacity. (Kern County, 2003e) The Mojave Specific Plan growth and development predictions for 2010 exceed those anticipated by the MPUD Master Sewer Plan. To mitigate this discrepancy, any new development projects in the Mojave community must either obtain a "will serve" letter from the MPUD verifying that the District will provide sewer service to the project or provide evidence of connection to a centralized waste treatment system. The Mojave Airport is an existing customer of the MPUD wastewater treatment system with no proposed construction or development plans. Although some short and long-term increases in wastewater generation at the Mojave Airport would result from the proposed action, growth and development plans have accounted for these increases. Any impacts on the wastewater system due to the proposed action would be insignificant. The proposed action would not exceed current wastewater treatment capability, require the construction of new wastewater treatment facilities, or require an expansion of existing

facilities. The proposed action would not increase pollution concentrations or cause violations of wastewater treatment requirements of the Lahontan Water Quality Control Board.

Non-hazardous solid waste from the Mojave Airport is sent to the Mojave-Rosamond Sanitary Landfill. The Mojave-Rosamond Sanitary Landfill has remaining capacity of 335,658 metric tons (370,000 tons) with an estimated closure date of 2013. (Kern County, 2003e) Other landfills in the area can serve the airport including the Tehachapi, the Ridgecrest, the Boron, and the Bena landfills. (Kern County, 2003e) An increase of solid waste generated at the Mojave Airport will occur as a result of the proposed action; however, the increase will not be significant. The Mojave-Rosamond Sanitary Landfill and other area landfills would have sufficient permitted capacity to accommodate the proposed action solid waste disposal needs. The proposed action would comply with Federal, state, and local statutes and regulations related to solid waste.

Because no construction or expansion to the existing facilities would occur, the proposed action would not substantially interfere with electrical or natural gas services either on- or off-site. The proposed action would not interfere with the capacity to serve the proposed action's projected demand in addition to the provider's existing commitments.

Utilities and service systems in the off-site ROI outside of the Mojave community would not be impacted by the proposed action. The proposed vehicles would operate at an altitude above the off-site ROI that would not impact utilities or their infrastructure. In the case of a catastrophic event, debris and wreckage from the vehicles could impact utilities or their infrastructure. However, because of the small vehicle sizes of the proposed action, the low probability of a catastrophic accident, and the extensive emergency response and clean-up procedures in place at the airport, the impacts would be insignificant.

5.12.2 Alternative 1

Alternative 1 would have no significant impacts on water resources. Alternative 1 would consist of Concept A only, which would conduct a maximum of 6 launches per year. Fewer launches would result in fewer visitors and tourist and less impact on water resources and utilities. Therefore, the impacts of Alternative 1 would be less than those of the proposed action.

5.12.3 Alternative 2

Alternative 2 would have no significant impacts on water resources. Alternative 2 would consist of Concept A only, which would conduct a maximum of 50 launches per year. Fewer launches would result in fewer visitors and tourist and less impact on water resources and utilities. Therefore, the impacts of Alternative 2 would less than those of the proposed action.

5.13 No Action Alternative

Under the No Action Alternative, the FAA would not issue a launch site operator license to EKAD for launches of Concept A and Concept B launch vehicles from the Mojave Airport. No launches of Concept A or Concept B launch vehicles would take place from the Mojave Airport. The Airport would continue to operate as a General Aviation Airport.

The predicted environmental effects of the Proposed Action would not occur. The existing on-site and off-site conditions at the Mojave Airport would remain unchanged and would be as described in Section 3, Affected Environment.

6. Cumulative Impacts

6.1 Air Quality

6.1.1 Proposed Action

Cumulative air quality impacts can be localized (e.g., ambient air quality) or global (e.g., global warming). To examine cumulative localized air quality impacts, the EPA has specified several screening tests in its various regulations. The screening tests are

1. The proposed action does not produce emissions above certain de minimis levels for criteria pollutants for areas that are in non-attainment for Federal ambient air quality standards, and
2. The action must not be considered regionally significant. Regionally significant actions are ones for which the total emissions from the action equal or exceed 10 percent of the air quality control area's emissions inventory for any criteria pollutant.

Table 6-1 presents estimates of air emissions below 914 meters (3,000 feet) from the proposed action. This includes estimated emissions from the launch of the Concept A carrier vehicle, the launch of the Concept B vehicle, fuel-delivery trucks, and fueling operations. As seen in table 6-1, the proposed action would approach but would not exceed the thresholds for any of these tests for potential cumulative impacts.

Cumulative impacts of emissions from launches have the potential to affect global warming. The total CO_2 emissions for the proposed action would be approximately 103 metric tons (113 tons) in 2008 (highest estimated launch rate). This includes emissions outlined in Table 6-1, in addition to emissions from the launch of Concept A and B vehicles above 914 meters (3,000 feet). As comparison, CO_2 emissions from the PEIS of commercial launches of expendable launch vehicles (DOT, 2001) were estimated to be much more than the proposed action (approximately 4,536 metric tons per year (5,000 tons per year)). Additionally, the cumulative impact on global warming from launches would be insignificant when compared to emissions from other industrial sources. Total CO_2 emissions from all sources in the U.S. were 5,159 million metric tons (5,687 million tons) in 1994. The proposed action would account for only a fraction (less than 0.000002%) of these CO_2 emissions. Consequently, the total expected CO_2 emissions from the proposed action would be insignificant. There would be no emissions that directly affect ozone depletion. Therefore, no significant cumulative impacts to air quality are expected.

Table 6-1. Air Emissions (pounds) Below 914 meters (3,000 feet) from Proposed Action in Year 2008 (both Concept A and B)

Emission Activities	CO_2 kilograms (pounds)	CO kilograms (pounds)	NO_x kilograms (pounds)	VOC kilograms (pounds)	PM kilograms (pounds)	H_2O kilograms (pounds)	SO_x kilograms (pounds)
Launch	14,447 (31,850)	6,122 (13,496)	3.3 (7.3)	29 (63)	68 (150)	8,845 (19,500)	1.7 (3.7)
Truck	-	9.1 (20)	9.5 (21)	1.5 (3.3)	0.7 (1.6)	-	-
Fueling	-	-	-	2,186 (4,818)	-	-	-
Total kilograms (pounds)	14,447 (31,850)	6,131 (13,517)	13 (28)	2,215 (4,884)	69 (152)	8,845 (19,500)	1.7 (3.7)
Total metric tons/year (tons/year)	14.4 (15.9)	6.2 (6.8)	0.01 (0.01)	2.2 (2.4)	0.07 (0.08)	8.9 (9.8)	0.002 (0.002)
Comparison Against Regulatory Threshold Screening Tests							
Test 1 - Regulatory De Minimis Thresholds metric tons/year (tons/year)	-	-	45.4 (50.0)	45.4 (50.0)	-	-	-
Test 2 - Percent of Regional Emissions*	-	5 %	0.0001%	0.05%	0.6%	-	-

*****Percent is 100 times the emissions of NO_x and VOC from proposed action divided by the regional inventory of emissions - data on inventory emissions are those reduced emissions since 1990 from KCAPCD, 2000. For CO and PM, emissions from the proposed action were compared against current emissions from airport operations only (see Affected Environment). Actual percent of CO and PM would be much less if compared against the full inventory of emissions in the region.

6.1.2 Alternative 1

Because the cumulative impacts for air quality for the proposed action would be insignificant, the cumulative impacts for Alternative 1 (Concept A only) would also be insignificant.

6.1.3 Alternative 2

Because the cumulative impacts for air quality for the proposed action would be insignificant, the cumulative impacts for Alternative 2 (Concept B only) would also be insignificant.

6.2 Airspace

6.2.1 Proposed Action

The proposed action would have no significant cumulative impacts on airspace. The proposed action would involve a total of 148 flights over five years from the Mojave Airport at a maximum frequency of 1.1 flights per week. This would represent only a 0.3 percent increase in the annual activity at the Mojave Airport. The off-site impacts to airspace would take place primarily in the R-2508 Complex. In 2000, Edwards AFB estimated that a total of 11,168 landings occurred on Edwards AFB Runway 22, alone. (DoD, 2002a) The R-2508 Complex scheduling and controlling agencies regulate the flight of all aircraft in the restricted area. Aircraft without proper authorization are prohibited from entering the R-2508 Complex. Therefore, any proposed launches with potential significant impacts to the R-2508 Complex would be prevented from occurring by the scheduling and controlling agencies. Any flight paths that exit the R-2508 Complex would do so at an altitude approximately 57,927 meters (190,000 feet) above any established en route airways. Because of the volume of air traffic that utilizes this area already and the structured scheduling procedures in place for joint-use of the R-2508 Complex, the proposed action would have no significant cumulative effects on airspace.

6.2.2 Alternative 1

Alternative 1 would consist of a maximum of 33 flights over five years. The number of flights would be significantly less than the proposed action, thus any cumulative impacts would be significantly less than the proposed action.

6.2.3 Alternative 2

Alternative 2 would consist of a maximum of 115 flights over five years. The number of flights would be less than the proposed action, thus any cumulative impacts would be significantly less than the proposed action.

6.3 Biological Resources

6.3.1 Proposed Action

No significant cumulative impacts to biological resources would occur as a result of the proposed action. The proposed action would not include any construction or development on- or off-site of the Mojave Airport. As a result, no significant cumulative impacts to vegetation, wildlife, threatened and endangered species, migratory wildlife corridors, wetlands, sensitive areas, or critical habitat would be anticipated.

The maximum number of launches from Mojave Airport for both Concept A and Concept B would be 56 per year. The proposed action would slightly increase the number of high intensity noise events. Both Concept A and B launch vehicles also have the potential to cause sonic booms, which could impact wildlife on and off the Mojave Airport site. Based on the existing noise sources and intensities at the Mojave Airport and within the R-2508 Complex, the proposed action would have no significant cumulative impacts on

noise. This would result in no significant cumulative impacts of noise on biological resources.

6.3.2 Alternative 1

Because the cumulative impacts for biological resources for the proposed action would be insignificant, the cumulative impacts for Alternative 1 would also be insignificant.

6.3.3 Alternative 2

Because the cumulative impacts for biological resources for the proposed action would be insignificant, the cumulative impacts for Alternative 2 would also be insignificant.

6.4 Cultural Resources

6.4.1 Proposed Action

No significant cumulative impacts to cultural resources would occur as a result of the proposed action. The proposed action would not include any construction or development on or off the Mojave Airport site. Because it was determined that the proposed action would have no adverse effects on cultural resources, no significant cumulative impacts to National Register sites, California Register sites, National Historic Landmarks, paleontological resources, human remains, or tribal lands would be anticipated.

6.4.2 Alternative 1

Because the cumulative impacts for cultural resources for the proposed action would be insignificant, the cumulative impacts for Alternative 1 would also be insignificant.

6.4.3 Alternative 2

Because the cumulative impacts for cultural resources for the proposed action would be insignificant, the cumulative impacts for Alternative 2 would also be insignificant.

6.5 Geology and Soils

6.5.1 Proposed Action

The proposed action would not entail any changes to the built environment at the Mojave Airport, and therefore no significant cumulative impacts are expected to geology, mineral resources, seismicity, erosion or hydrology.

Concept A launch vehicles would not create a ground cloud since ignition of rocket engines would take place at 15,240 meters (50,000 feet), and therefore no significant cumulative impacts would occur to soils as a result of these launches. Launches of Concept B vehicles would create a ground cloud, which would be dispersed along the runway, and 50 such launches per year would result in additive impacts to soils.

However, Concept B vehicles use liquid propellants, which would create a ground cloud consisting of CO, CO_2, H_2, and H_2O. These emissions would evaporate and dissipate in the environment and therefore would not result in a significant cumulative impact.

6.5.2 Alternative 1

Because the cumulative impacts for geology and soils for the proposed action would be insignificant, the cumulative impacts for Alternative 1 would also be insignificant.

6.5.3 Alternative 2

Because the cumulative impacts for geology and soils for the proposed action would be insignificant, the cumulative impacts for Alternative 2 would also be insignificant.

6.6 Hazardous Materials and Hazardous Waste Management

6.6.1 Proposed Action

No significant impacts would be expected from the use of hazardous materials to support Concept A and B operations. No significant cumulative impacts would be projected from handling hazardous materials and hazardous waste. Impacts from past use of hazardous materials at Mojave Airport might occur from the discovery of abandoned underground storage tanks or unreported releases/spills. However, under CERCLA any contamination from the storage tanks or in the ground would be monitored and if removal became necessary, CERCLA provisions would protect human health and the environment during cleanup. The other current uses of hazardous materials at Mojave are minimal, and present no impact on human health or the environment. Neither Mojave Airport nor other industries in the area, as specified in the Mojave Specific Plan, have plans to increase use of hazardous materials in the future.

6.6.2 Alternative 1

Because the cumulative impacts for hazardous materials and hazardous waste for the proposed action would be insignificant, the cumulative impacts for Alternative 1 would also be insignificant.

6.6.3 Alternative 2

Because the cumulative impacts for hazardous materials and hazardous waste for the proposed action would be insignificant, the cumulative impacts for Alternative 2 would also be insignificant.

6.7 Health and Safety

6.7.1 Proposed Action

Existing operations at the Mojave Airport include testing of new aircraft and use of various hazardous materials. The existing baseline shows limited risk to health and

safety. The proposed action would bring new operations and additional health and safety challenges. The proposed action would require additional quantities of hazardous materials including propellants (e.g., LO_x, N_2O, kerosene,) to be shipped to the Mojave Airport. Although the Mojave Airport has experience handling many of these materials, potential users of the launch site would need to have procedures, policies, and training to manage any additional risk posed by their proposed operations. The area around the Mojave Airport is already exposed to the risk associated with accidents from an airport that serves as a testing ground for new types of aircraft. The proposed action would increase the risk of accidents but the Concept A and B operators would mitigate this risk by avoiding populated areas. Detailed analyses of safety and related issues would be addressed in the FAA's Mission and Safety Review prior to issuing a launch license. However, safety and health analyses of operations that have the potential for environmental impact were considered in the EA and were determined to have no significant cumulative impacts on the environment.

6.7.2 Alternative 1

Because the cumulative impacts for health and safety for the proposed action would be insignificant, the cumulative impacts for Alternative 1 (Concept A only) would also be insignificant.

6.7.3 Alternative 2

Because the cumulative impacts for health and safety for the proposed action would be insignificant, the cumulative impacts for Alternative 2 (Concept B only) would also be insignificant.

6.8 Land Use

6.8.1 Proposed Action

No significant cumulative impacts to land use would occur as a result of the proposed action. The proposed action would not include any construction or development activities on or off the Mojave Airport site. Therefore, no impacts to the PCC zones would occur within the airport region of influence. The vehicles would use Runway 12-30 for proposed launch and landing activities. This runway would direct flights over areas designated for commercial, industrial, resource management, and open land uses. These land uses are compatible with the proposed activities and noise levels. The proposed action would not cumulatively impact agricultural and recreational resources. Cumulative noise impacts on sensitive land uses are discussed in Section 6.9.1.

6.8.2 Alternative 1

Because the cumulative impacts for land use for the proposed action would be insignificant, the cumulative impacts for Alternative 1 would also be insignificant.

6.8.3 Alternative 2

Because the cumulative impacts for land use for the proposed action would be insignificant, the cumulative impacts for Alternative 2 would also be insignificant.

6.9 Noise

6.9.1 Proposed Action

No significant cumulative impacts to noise levels would occur as a result of the proposed action. Over 1,200 jet aircraft takeoff and land at the Mojave Airport annually. In addition, periodic stationary rocket engine tests are conducted at the airport. These activities generate high single event noise levels. Launches of the proposed vehicles would generate high single event noise levels at the Mojave Airport for an additional 4.4 minutes per week. This additional time would not represent a significant cumulative impact on the noise levels at the airport. Aircraft currently operating in the R-2508 Complex that travel at supersonic speeds include the F-15, the F-16, and the F-18. Previous Sonic boom tests conducted on the SR-71, which travels at Mach 2.0 to 3.0, found that overpressures at 19,817 to 24,390 meters (65,000 to 80,000 feet) above MSL were less than 4.88 kilograms per square meter (1.0 psf). Overpressures below 4.88 kilograms per square meter (1.0 psf) rarely cause adverse effects. The proposed vehicles would reach comparable supersonic speeds at altitudes similar to or greater than the SR-71. Cumulative noise impacts on sensitive land uses would be less than 65 dBA L_{dn} and less than 65 dBA CNEL. Ten daytime sonic booms of 4.88 kilograms per square meter (1 pound per square foot) everyday for a year would yield an L_{dn} of 65 dBA. (DoD, 2002a) An L_{dn} of 65 dBA is the accepted level for outdoor noise levels related to transportation. In the EA for the Orbital Reentry Corridor for Generic Unmanned Lifting Entry Vehicle Landing at Edwards AFB, the USAF considered up to 12 flights per year. Currently an average of two military jet aircraft takeoff and/or land at the Mojave Airport per day. These military aircraft can produce sonic booms. Even in the worst case scenario, i.e., one launch from the Mojave Airport, one launch of the proposed Unmanned Lifting Entry Vehicle from Edwards AFB, and two jet aircraft takeoffs or landings from the Mojave Airport, there would not be more than 10 sonic booms generated per day in the ROI. Therefore, there would be no significant cumulative impacts to noise from the proposed action. Based on the current noise sources and intensities at the Mojave Airport and within the R-2508 Complex, the proposed action would have no cumulative impacts on noise.

6.9.2 Alternative 1

Because the cumulative impacts for noise for the proposed action would be insignificant, the cumulative impacts for Alternative 1 would also be insignificant.

6.9.3 Alternative 2

Because the cumulative impacts for noise for the proposed action would be insignificant, the cumulative impacts for Alternative 2 would also be insignificant.

6.10 Socioeconomics and Environmental Justice

6.10.1 Proposed Action

No significant cumulative impacts to socioeconomics and environmental justice would occur as a result of the proposed action. The proposed action would not include any construction or development on or off the Mojave Airport site and only personnel already on-site would be used to conduct launch activities. As a result, no significant cumulative impacts to population, housing, employment, schools, infrastructure, or public and emergency services would be expected. The proposed action would not cause negative socioeconomic impacts to the region.

Air emissions may result in cumulative impacts to local communities. None of the emissions would be expected to expose the nearby population or sensitive receptors to substantial pollutant concentrations or to objectionable odors of the type that do not already exist from airport operations (e.g., fuel and exhaust odors). Because air emissions would not have significant cumulative effects on air quality, no significant cumulative impacts to socioeconomics and environmental justice would be expected to occur.

The maximum number of launches from Mojave Airport for both Concept A and Concept B would be 56 per year. Both Concept A and Concept B launch vehicles have the potential to cause sonic booms, which could impact local communities, including environmental justice groups. Based on the current noise sources and intensities at the Mojave Airport and within the R-2508 Complex, the proposed action would have no significant cumulative impacts on noise. This would result in no disproportionate impacts on economically disadvantaged or minority groups.

6.10.2 Alternative 1

Because the cumulative impacts for socioeconomics and environmental justice for the proposed action would be insignificant, the cumulative impacts for Alternative 1 would also be insignificant.

6.10.3 Alternative 2

Because the cumulative impacts for socioeconomics and environmental justice for the proposed action would be insignificant, the cumulative impacts for Alternative 1 would also be insignificant.

6.11 Transportation

6.11.1 Proposed Action

No significant cumulative impacts would be expected to transportation systems from the operation of Concept A and B vehicles. The Mojave Specific Plan Draft EIR projects that the future LOS for portions of the Sierra Highway (between the SR-14 cutoff and the SR-58 cutoff, and south of the SR-58 cutoff to Purdy Avenue) would be below LOS D.

Growth in the region has been projected to lead to significant and unavoidable impacts on traffic congestion. The proposed action was not considered in the Mojave Specific Plan Draft Environmental Impact Report but would increase the number of vehicles in the region by a maximum of 23 delivery trucks per year.

6.11.2 Alternative 1

For alternative 1, a maximum of eight trucks per year would be needed to deliver propellants for Concept A vehicles. These trucks would travel on the Sierra Highway that has a LOS rating of LOS E, which indicates more congestion than guidelines suggest.

6.11.3 Alternative 2

For alternative 2, in the year 2008, a maximum of 15 trucks would be needed to provide propellant for Concept B vehicles. These trucks would travel on the Sierra Highway that has a LOS rating of LOS E, which indicates more congestion than guidelines suggest.

6.12 Visual and Aesthetic Resources

6.12.1 Proposed Action

The proposed action would not entail any changes to the built environment at Mojave Airport. It would add a maximum of 56 flights per year to the current flight schedule. The Mojave Airport is currently operating at three percent of capacity and the addition of up to 56 flights in one year would not exceed the airport's operational abilities. The additional flights would not create a significant cumulative impact on visual and aesthetic resources.

6.12.2 Alternative 1

Because the cumulative impacts for visual and aesthetic resources for the proposed action would be insignificant, the cumulative impacts for Alternative 1 would also be insignificant.

6.12.3 Alternative 2

Because the cumulative impacts for visual and aesthetic resources for the proposed action would be insignificant, the cumulative impacts for Alternative 2 would also be insignificant.

6.13 Water Resources

6.13.1 Proposed Action

No significant cumulative impacts to water resources would occur as a result of the proposed action. The proposed action would not include any construction or development on or off the Mojave Airport site. This would result in no significant

cumulative impacts to storm water drainage paths, flooding, erosion, surface water bodies, or ground water resources. The Mojave Airport, in its present role as a general aviation airport, has been in operation since 1972, and is a long-standing customer of the MPUD and the Mojave-Rosamond Sanitary Landfill. Development and growth plans for the Mojave community and the MPUD have anticipated and accounted for increases in demand from the Mojave Airport for utilities and solid waste services. Therefore, any increases in the need for water supply, wastewater treatment, and solid waste handling as a result of the proposed action would have an insignificant impact. The proposed action would have no significant cumulative impacts on utilities and service system infrastructure.

6.13.2 Alternative 1

Because the cumulative impacts for water resources for the proposed action would be insignificant, the cumulative impacts for Alternative 1 would also be insignificant.

6.13.3 Alternative 2

Because the cumulative impacts for water resources for the proposed action would be insignificant, the cumulative impacts for Alternative 2 would also be insignificant.

6.14 Secondary or Induced Impacts

CEQ defines Secondary Impact as "those that are caused by an action and are later in time and farther removed in distance but still foreseeable." These impacts are induced by the initial action. Examples of Secondary Impacts include shifts in patterns of population movement and growth, public service demands, and changes in business and economic activity to the extent influenced by the proposed action.

6.14.1 Proposed Action

Although the proposed action would support and facilitate limited growth, it would not induce growth. Additionally, there would be no specific future development activities currently known that would be dependent on the proposed action. Therefore no secondary impacts are expected to result from the proposed action.

6.14.2 Alternative 1

Because no secondary impacts are expected for the proposed action, there would be no secondary impacts expected for Alternative 1.

6.14.3 Alternative 2

Because no secondary impacts are expected for the proposed action, there would be no secondary impacts expected for Alternative 2.

This Page Intentionally Left Blank

7. Glossary

A-weighted Sound Level (dBA). A number representing the sound level that is frequency weighted according to a prescribed frequency response established by the American National Standards Institute and accounts for the response of the human ear.

Airspace. Airspace is the defined space above a nation, which is under its jurisdiction. Airspace is limited horizontally, vertically, and temporally, and is regulated by the FAA.

Ambient Air Quality Standards. Standards established on a state of Federal level, that define the limits for airborne concentrations of designated "criteria" pollutants (nitrogen dioxide, sulfur dioxide, carbon monoxide, particulate matter, ozone, and lead), to protect public health and an adequate margin of safety (primary standards) and to protect public welfare, including plant and animal life, visibility, and materials (secondary standards).

Apogee. The highest point in a launch vehicle's trajectory.

Attainment Areas. Regions that meet the EPA National Ambient Air Quality Standards (NAAQS) for a criteria pollutant under the Clean Air Act.

Criteria Pollutant. A pollutant determined to be hazardous to human health and regulated under the EPA's National Ambient Air Quality Standards. The 1970 amendments to the Clean Air Act requires the EPA to describe the health and welfare impacts of a pollutant as the "criteria" for inclusion in the regulatory regime.

Cumulative Impacts. The combined impacts resulting from all activities occurring concurrently at a given location.

Day-Night Average Noise Level (L_{dn}). Accounts for increased annoyance associated with nighttime noise events. An A-weighted noise equivalency for a 24-hour day that is calculated by adding a penalty to sound levels occurring at night.

Decibels (dB). A unit for describing the ratio of two powers or intensities, or the ratio of a power to a reference power. In measurement of sound intensity, the pressure of the reference sound is usually taken as 2×10^{-4} dyne per square centimeter (equal to one-tenth bel).

Endangered Species. A plant or animal that is in danger of extinction throughout all or a significant portion of its range.

Flight Safety System (FSS). Flight safety system means the system that provides a means of control during flight for preventing a launch vehicle and any component, including any payload, from reaching any populated area in the event of a launch vehicle failure.

Geologic Hazard. A geologic hazard is a naturally occurring or man-induced geologic condition that presents a risk or a potential danger to life and property. Such hazards could include phenomena such as landslides, flooding, ground subsistence, faulting, and earthquakes.

Government Range. Government owned property located throughout the U.S. where missiles, rockets, armaments, and new aircraft designs are tested. A government range can include various assets to gather data and monitor and track testing operations. In addition, these lands may be withdrawn or restricted from public use.

Hybrid Propulsion/System/Fuels. A propulsion system that uses solid fuel and a liquid oxidizer, giving it the ability to throttle, shut-off, and re-start in mid-flight.

Impacts. An assessment of the meaning of changes in all attributes being studied for a given resource, an aggregation of all of the adverse effects, usually measured using a qualitative and nominally subjective technique.

Noise. Sound that is unwanted either because of its effect on humans, its effect on fatigue or malfunction of physical equipment, or its interference with the perception or detection of other sounds.

Non-Attainment Area. An area that has been designated by the EPA or the appropriate state air quality agency, as exceeding one or more national or state Ambient Air Quality Standards.

Payload. The payload is the item that an aircraft or rocket carries over and above what is necessary for the operation of the vehicle in flight.

Propellants. Balanced mixture of fuels and oxidizers designed to produce large volumes of hot gases at controlled, predetermined rates, once the burning reaction is initiated.

Reusable Launch Vehicle (RLV). An RLV, as defined in 14 CFR § 401.5, means "a launch vehicle that is designed to return to Earth substantially intact and therefore may be launched more than one time or that contains vehicle stages that may be recovered by a launch operator for future use in the operation of a substantially similar launch vehicle.

Socioeconomics. The basic attributes and resources associated with the human environment, in particular population and economic activity. Socioeconomic resources consist of several primary elements including population, employment, and income. Other socioeconomic aspects that are often described may include housing and an overview of the local economy.

Sonic Boom. A noise caused by a shock wave that emanates from an aircraft or other object traveling at or above the speed of sound.

Suborbital Rocket. The following definition for suborbital rocket is being considered for adoption by AST but has not yet been approved: "a rocket propelled vehicle intended for flight on a suborbital trajectory whose thrust is greater than its lift for the majority of the powered portion of its flight."

Suborbital Trajectory. The following definition has been proposed for suborbital trajectory within AST but has not yet been approved: "the intentional flight path of a launch vehicle, reentry vehicle, or any portion thereof whose vacuum instantaneous impact point does not leave the surface of the earth."

Telemetry. Automatic data measurements and transmission from remote sources, such as space vehicles, to receiving stations for recording and analysis.

Threatened Species. Plant and wildlife species likely to become endangered in the foreseeable future.

This Page Intentionally Left Blank

8. References

Borax. 2003. www.borax.com, accessed 9/10/03

Bureau of Land Management (BLM). 2003. http://www.ca.blm.gov/ridgecrest/topten.html, accessed 9/10/03.

California Environmental Protection Agency, Air Resources Board. 2000. http://www.arb.ca.gov/desig/adm/adm.htm, accessed 9/8/03.

California Environmental Protection Agency, Air Resources Board. 2002. *User Guide for Emission Factor Model*. December, 2002.

California Environmental Protection Agency, Air Resources Board. 2003. http://www.arb.ca.gov/aqs/aaqs2.pdf, accessed 9/10/03.

California State Water Resources Control Board. 1999. *National Pollutant Discharge Elimination System Storm Water Permit No. CAS000003, Statewide Storm Water Permit and Waste Discharge Requirements*. Department of Transportation, State of California.

California State Water Resources Control Board. 2003. http://www.swrcb.ca.gov/rwqcb6/images/maps/reg6lah.gif, accessed 9/8/03.

California Department of Toxic Substances Control. 2003. *DTSC's Hazardous Waste and Substances Site List (Cortese List).* http://www.dtsc.ca.gov/database/Calsites/Cortese_List.cfm?county=15, accessed 9/19/03.

Chemical Propulsion Information Agency. 1984. *Hazards of Chemical Rockets and Propellants, Volume III Liquid Propellants*, September.

Department of Defense. 2002a. *Final Environmental Assessment for the Orbital Reentry Corridor for Generic Unmanned Lifting Entry Vehicle Landing at Edwards Air Force Base*, Edwards Air Force Base, California, December.

Department of Defense. 2002b. *Digital Airport Surveillance Radar Environmental Assessment*, Edwards Air Force Base, California, June.

Department of Transportation. 1992. *Final Programmatic Environmental Impact Statement for Commercial Reentry Vehicles (PEIS CRV)*, Department of Transportation, Office of Commercial Space Transportation, May.

Department of Transportation. 2001. *Final Programmatic Environmental Impact Statement for Licensing Launches (PEIS LL)*. Department of Transportation, Office of Commercial Space Transportation, May.

Department of Transportation, 2002. *Final Environmental Assessment for the Site, Launch, Reentry, and Recovery Operations at the Kistler Launch Facility, Nevada Test Site,* April.

East Kern Airport District. 2001. *East Kern Airport District Administrative Code*.

East Kern Airport District. 2003. *Spill Prevention Control and Countermeasure Plan,* July.

Edwards AFB. 2003. Edwards Air Force Base web site, http://www.edwards.af.mil, http://r2508.edwards.af.mil/, http://r2508.edwards.af.mil/maj_work_areas/chap4-1.html, accessed 8/5/03 through 9/15/03.

Environmental Protection Agency. 1980. Compilation of Air Pollutant Emissions Factors. EPA AP-42.

Environmental Protection Agency. 1992. *Procedures for Emission Inventory Preparation Volume IV: Mobile Sources.*

Environmental Protection Agency. 2002. *Water-Efficient Landscaping: Preventing Pollution and Using Resources Wisely*.

Federal Aviation Administration/U.S. Air Force. 1997. *Air Quality Procedures for Civilian Airports and Air Force Bases.*

Federal Aviation Administration. 2002. *Federal Aviation Administration Certificate of Waiver for East Kern Airport District*.

Federal Aviation Administration 2003a. http://www1.faa.gov/atpubs/PCG/INDEX.HTM, accessed 8/30/03.

Federal Aviation Administration. 2003b. Federal Aviation Administration, Annual Consolidation of Part 95 - Subchapter F, Minimum En route IFR Altitudes Over Particular Routes and Intersections.

Federal Emergency Management Agency. 1994. Flood Boundary and Floodway Map, Kern County, California, Unincorporated Areas, March 2, 1994.

Federal Emergency Management Agency. 1995. Flood Insurance Study, Kern County, California, Unincorporated Areas, September 6, 1995.

Getchell, Barbie S. and John E. Atwood. 2003 (Unpublished). *Cultural Resources Inventory of the 160-acre Runway Extension Project for the East Kern Airport District in the Community of Mojave, Kern County, California*. PAST, Inc., prepared for EKAD, August.

Kern County Air Pollution Control District. 1993. *Rate of Progress Plan*.

Kern County Air Pollution Control District. 1994a. *Reasonable Further Progress Plan*.

Kern County Air Pollution Control District. 1994b. *Attainment Demonstration Plan*.
Kern County Air Pollution Control District. 1994c. *Federal Ozone Attainment Demonstration Plan*, October.

Kern County Air Pollution Control District. 1996. *Emission Baseline*.

Kern County Air Pollution Control District. 1997. *Emission Baseline*.

Kern County Air Pollution Control District. 2000. *California Clean Air Act Ozone Air Quality Attainment Plan*.

Kern County. 1982. *Kern County General Plan*.

Kern County. 1996. *Airport Land Use Compatibility Plan*.

Kern County. 2000. *California Clean Air Act Kern County Ozone Air Quality Plan*, November.

Kern County. 2003a. *Draft Environmental Impact Report and Statement for the West Mojave Plan: A Habitat Conservation Plan and California Desert Conservation Area Plan Amendment, Volume I*, U.S. Department of the Interior, May.

Kern County. 2003b. *County of Kern Mojave Specific Plan, Draft Environmental Impact Report*, June.

Kern County. 2003c. *County of Kern Airport Land Use Compatibility Plan, Amended*.

Kern County. 2003d. *Environmental Noise Assessment for the Civilian Flight Test Center Master Plan*.

Kern County. 2003e. *Draft Environmental Impact Report Mojave Specific Plan*, Kern County Planning Department. June.

Kern County. 2003f. *Mojave Desert Community Response Plan*, Kern County Office of Emergency Services.

LOA R-2508 Complex Control Board, Edwards Air Force Base and National Test Pilot School. 2002. Letter of Agreement between R-2508 Complex Control Board, Edwards Air Force Base and National Test Pilot School.

LOA SPORT. 1994. Letter of Agreement with SPORT Radar Control Facility.

LOA TRACON. 1996. Letter of Agreement with High Desert Terminal Radar Approach Control.

LOA TRACON. 2001. Letter of Agreement with High Desert Terminal Radar Approach Control.

Mapquest.com. 2003. http://www.mapquest.com/maps/map.adp?size=big&mapdata=jZ2g%2b%2fXW8V8joO5zAvCSBjrLct7D8%2fDfTTrL6WV3ycQ4dCdYOIAi8bIF%2b6lViHffOpgAu0ncMH8%2bMHjyetbebGb0ZABt%2bKMS%2fEEQFNa19MTz4R4VRZZZGa9bQfXJLZ5t7qeN%2f10y84ltafGL%2bB9DNo4olkiFy8Z6MfFglSp5BzoOMt8AyHXLUH4axI5oMnZo1A63bKoTUPRP3b3%2bakQ%2bIOq%2bGIsOQWaK1uNTkWwNYFYFbWFXGsqox7MK70VK9MW8NytUjZbZef40iexfHKY3mM31%2bf4KSpfp, accessed 8/30/03

Maps.com. 2003. http://www.maps.com/cgi-bin/maps/aerochart.pl, accessed 8/30/03.

Mojave Airport. 2003a. http://www.mojaveairport.com/, http://www.mojaveairport.com/newweb/visitor.htm, http://www.mojaveairport.com/newweb/runways.htm, accessed from 7/29/03 through 9/19/03.

Mojave Airport. 2003b. Communication from Stuart Witt, August 28, 2003.

Mojave Airport. 2003c. *Mojave Airport Reusable Launch Vehicle Site License Application*, August.

Mojave Airport. 2003d. Communication from Bob Rice, September 11, 2003.

National Aeronautics and Space Administration. 1997. *X-33 Advanced Technology Demonstrator Vehicle Program, Final Environmental Impact Statement*, September.

National Park Service. 2003a. National Register of Historic Places, communication from Heather Cushman.

National Park Service. 2003b. On-line National Park Service Database, http://www.cr.nps.gov/places.htm, accessed 11/2/03.

University of California at Davis. 2003. http://icemaps.des.ucdavis.edu/icemaps2/ICEMapInit.html, accessed 9/5/03.

U.S. Bureau of Census. 2000. 2000 Census. http://www.census.gov/main/www/cen2000.html, accessed 9/10/03.

U.S. Department of Agriculture, Soil Conservation Service. 1982. Soil Survey of Kern County, California, Southeastern Part.

U.S. Department of the Interior. 2003. Communication from Judy Hohman, Division Chief/Mojave/Great Basin Deserts, U.S. Fish and Wildlife Service, December 8, 2003.

U.S. Department of the Interior. 2004. Communication from Judy Hohman, Division Chief/Mojave/Great Basin Deserts, U.S. Fish and Wildlife Service, January 23, 2004.

U.S. Department of the Navy. 1996. *Environment Assessment FA-18 E/F Hornet Store Separation Testing at NAS Patuxent River*, June.

Windland, Inc. 2003. www.windland.com, accessed 9/10/03.

Xprize. 2003. www.xprize.org, accessed 7/28/03.

Yahoo Maps. 2003. http://maps.yahoo.com/py/maps.py?Pyt=Tmap&addr=&city=Mojave&state=CA&csz=Mojave,+CA&slt=35.052376&sln=-118.173592&zip=&country=us&&BFKey=BFCat=&BFClient=&mag=8&cs=8&name=&desc=&off=e&poititle=&poi=&ds=g, accessed 9/8/03.

This Page Intentionally Left Blank

9. List of Preparers

This list presents the primary contributors to the technical content of this EA.

Name: **Michon Washington**
Affiliation: FAA Office of Commercial Space Transportation
Education: MS Environmental Management and Technology
Experience: Fifteen years of NEPA related Experience

Name: **Deborah Shaver**
Affiliation: ICF Consulting, FAA Contractor
Education: BS Chemistry, MS Chemistry
Experience: Twenty-nine years of environmental assessment management experience

Name: **Pam Schanel**
Affiliation: ICF Consulting, FAA Contractor
Education: BA Environmental Public Policy
Experience: Seven years of environmental assessment experience

Name: **Stacey Zee**
Affiliation: ICF Consulting, FAA Contractor
Education: BS Natural Resource Management, MS Environmental Policy
Experience: Seven years of environmental assessment experience

Name: **Brian Wrenn**
Affiliation: ICF Consulting, FAA Contractor
Education: BS Biology
Experience: Ten years of professional environmental experience

Name: **David Goldbloom-Helzner**
Affiliation: ICF Consulting, FAA Contractor
Education: BA Chemistry, BS Engineering and Policy
Experience: Seventeen years of experience in air quality and health and safety analyses

Name: **Krystina Hawryluk**
Affiliation: ICF Consulting, FAA Contractor
Education: BS Biology
Experience: Two years of environmental assessment experience

Name: **Jean Hoff**
Affiliation: ICF Consulting, FAA Contractor
Education: BA Chemistry, MS Chemistry, MBA General Management
Experience: Eighteen years of experience in environmental, energy, and transportation analyses

Name: **Sara Eisenstat**
Affiliation: ICF Consulting, FAA Contractor
Education: BA Environmental Science and Policy
Experience: One year of environmental assessment experience

Name: **Karen Northcutt**
Affiliation: Northcutt and Associates, EKAD Contractor
Education: BS Political Science
Experience: Thirty-one years of land planning and development experience

10. Agencies Contacted

U.S. Department of Transportation
Federal Aviation Administration

Commercial Space Transportation

800 Independence Ave., S.W, Room 331
Washington, D.C. 20591

SEP 16 2003

Dr. Knox Mellon
State Historic Preservation Office
Office of Historic Preservation
P.O. Box 942896
Sacramento, CA 94296

Re: Mojave Airport Launch Site Operator License

Dear Dr. Mellon:

The Mojave Airport, a General Aviation Airport, proposes to operate a launch site for horizontally launched, suborbital, reusable launch vehicles. This proposed action includes only the launch and landing of these vehicles on existing runways and does not include any construction or renovation to any buildings or facilities. In order to conduct commercial launch operations, the Mojave Airport must obtain a license from the Federal Aviation Administration (FAA).

Under the proposed action, the FAA would issue a launch site operator license for the Mojave Airport to operate a launch facility. A launch site operator license remains in effect for five years from the date of issuance unless surrendered, suspended, or revoked before the expiration of the term and is renewable upon application by the licensee (14 Code of Federal Regulations [CFR] 420.43). The licensing of launch site operations is a Federal action subject to requirements of the National Environmental Policy Act (NEPA). Since the proposed project would take place in the state of California, the project is also subject to the requirements of the California Environmental Quality Act (CEQA). The FAA is therefore in the process of preparing an Environmental Assessment that will address both NEPA and CEQA requirements. The Mojave Airport is implementing the proposed project in Kern County, Mojave, California. A location map is enclosed which shows the location of the project.

Pursuant to 36 CFR 800, the FAA is requesting the views of the State Historic Preservation Officer on any further actions to identify historic properties or properties that may be listed in the National Register of Historic Places that may be affected by this undertaking. Included with this letter is a return shipping label. Please mark any potentially affected properties and return the map via mail to the address indicated on the shipping label.

Thank you for your assistance in this matter. If you require further information to complete this request, please contact me at 202-267-9305.

Sincerely,

Michon Washington
Environmental Specialist

Cc: Daphne Fuller, FAA
Karen Northcutt, Northcutt and Associates

Enclosure as stated

STATE OF CALIFORNIA – THE RESOURCES AGENCY

GRAY DAVIS, Governor

OFFICE OF HISTORIC PRESERVATION
DEPARTMENT OF PARKS AND RECREATION
P.O. BOX 942896
SACRAMENTO, CA 94296-0001
(916) 653-6624 Fax: (916) 653-9824
calshpo@mail2.quiknet.com

October 21, 2003

REPLY TO: FAA030918A

Michon Washington, Environmental Specialist
Commercial Space Transportation
Federal Aviation Administration
800 Independence Avenue, S.W, Room 331
WASHINGTON DC 20591

Re: Mojave Airport Launch Site Operator License, Mojave, Kern County, California.

Dear Ms. Washington:

Thank you for submitting to our office your September 2003 letter regarding the Mojave Airport's proposed licensing for the operation of a launch site for horizontally launched, suborbital, reusable launch vehicles near the town of Mojave in Kern County. In order to conduct commercial launch operations, the Mojave Airport must obtain a license from the Federal Aviation Administration (FAA). A launch site operator license remains in effect for five years from the date of issuance unless surrendered, suspended, or revoked before expiration of the term and is renewable upon application of the licensee.

FAA is seeking my comments on its determination of the effects of the proposed project on historic properties in accordance with 36 CFR 800, regulations implementing Section 106 of the National Historic Preservation Act. A review of the submitted documentation leads me to recommend that the FAA do the following to fulfill its responsibilities for the identification and evaluation of historic resources for this project as set forth in 36 CFR 800:

- Establish an Area of Potential Effects (APE) for the project that will determine the scope of the undertaking and its potential to effect historic properties

- Identify and provide information on any historic properties that may be affected by the project and gather sufficient information to evaluate the eligibility of these properties for the National Register of Historic Places (NRHP). This information should include information on the age of the property, its historical significance, if any, as well as historical and/or current photographs of the property.

- For information on any archeological resources that may exist in the project area, FAA or its representatives should contact Ms. Adele Baldwin of the Southern San Joaquin Valley Information Center, California State University, Bakersfield, and request a archeological record search of the project area. The information center can be contacted by telephone at (661) 664-2289, or by FAX at (661) 664-2415, or by e-mail at abaldwin@csubak.edu.

- This letter represents neither acknowledgement that the FAA has consulted with the State Historic Preservation Officer (SHPO) under any applicable law or regulation or evidence of satisfactory FAA compliance with Section 106 for the undertaking.

I am prepared to provide such evidence in writing after I receive correspondence from the FAA requesting our comments on its determination that a geographic area associated with this undertaking either does not contain historic properties or does contain historic properties that will not be affected.

Thank you again for seeking my comments on your project. If you have any questions, please contact staff historian Clarence Caesar by phone at (916) 653-8902, or by email at ccaes@ohp.parks.ca.gov.

Sincerely,

Dr. Knox Mellon
State Historic Preservation Officer

U.S. Department of Transportation

Federal Aviation Administration

Commercial Space Transportation

800 Independence Ave., S.W, Room 331
Washington, D.C. 20591

Dr. Knox Mellon
State Historic Preservation Office
Office of Historic Preservation
P.O. Box 942896
Sacramento, CA 94296

Re: Mojave Airport Launch Site Operator License (FAA030918A)

Dear Dr. Mellon:

Per recommendations from your letter dated October 21, 2003, the Federal Aviation Administration (FAA) has established the Area of Potential Effects (APE)/Region of Influence (ROI) for the proposed issuance of a launch site operator license to the East Kern Airport District for operation of a launch site at the Mojave Airport as indicated in the enclosed map. The FAA notes that for any given launch from the Mojave Airport, the APE/ROI would be significantly smaller than the geographical area designed on the attached map.

The FAA has identified information on historic properties that are listed or are eligible for listing on the National Register of Historic Places as well as other historic sites designed by the State of California, which may occur in the APE/ROI. The FAA considered impacts to cultural resources in the *Draft Environmental Assessment/Initial Study for the East Kern Airport District Launch Site Operator License for the Mojave Airport* which was delivered to the California State Clearinghouse on November 3, 2003. The Environmental Assessment/Initial Study can be viewed at http://ast.faa.gov/lrra/EA_Mojave.htm. The Environmental Assessment/Initial Study specifically discusses the proposed use of Rogers Dry Lake (Muroc Dry Lake) as a landing location in the unlikely event of an emergency, the FAA has determined that emergency landings would not alter the characteristics of the site that qualify it for listing as a National Historic Landmark.

After contacting Ms. Adele Baldwin and consulting with Clarence Caesar from your office, the FAA does not believe that an archaeological records search is necessary for this proposed project. Additional details about the proposed project are listed below to support this determination by the FAA.

The proposed launch operations at the Mojave Airport are similar to current operations at the Airport. Two types of launch vehicles, identified in the Environmental Assessment/Initial Study

as Concept A and Concept B, have been identified as typical vehicles that would operate from the Mojave Airport. The Concept A launch vehicle would consist of a carrier aircraft and a mated suborbital launch vehicle. The carrier aircraft would takeoff from the existing runway at the Mojave Airport and carry the launch vehicle to a designated altitude. Rocket engines on the launch vehicle would fire and the carrier aircraft would return to the Airport to land on the runway. The launch vehicle would climb until the rocket propellant is consumed and would then descend and glide to a horizontal landing on the airport runway.

The Concept B launch vehicle would takeoff horizontally from the existing runway and would climb until the propellant is consumed. The launch vehicle would then descend and glide to a horizontal landing on the airport runway. Current operations at the Mojave Airport include the use of high performance jet aircraft, single- and twin-engine propeller aircraft and helicopters, MD80, F100, B737-300+, and hush-kitted 727s. The airport operations associated with launching Concept A and B vehicles are similar to existing operations at the Mojave Airport.

Based on the FAA's review of the proposed project under Section 106 of the National Historic Preservation Act, it has been determined that this project will have no adverse effect on historic properties. No sub-surface excavation activities would occur as a result of the proposed undertaking, therefore no impacts would occur to potential archeological resources within the APE/ROI. Finally, no historic structures exist on the airport property and no historic properties within the APE/ROI would be impacted by the proposed operations. This determination was made based on the fact that the properties occurring in the APE/ROI do not meet the criteria of 36 CFR § 800.5(a)(1).

The FAA requests your comments on the determination that the geographic area associated with the proposed undertaking does not contain historic properties that would be affected. If we do not hear from you within 30 days, we will assume that you concur with our determination and will proceed accordingly. Thank you for your assistance in this matter. If you require further information to complete this request, please contact me at 202-267-9305.

Sincerely,

Michon L. Washington
Environmental Specialist

Cc: Clarence Caesar, California SHPO
Daphne Fuller, FAA
Karen Northcutt, Northcutt and Associates

Enclosure as stated

STATE OF CALIFORNIA – THE RESOURCES AGENCY

ARNOLD SCHWARZENEGGER, Governor

OFFICE OF HISTORIC PRESERVATION
DEPARTMENT OF PARKS AND RECREATION
P.O. BOX 942896
SACRAMENTO, CA 94296-0001
(916) 653-6624 Fax: (916) 653-9824
calshpo@ohp.parks.ca.gov
www.ohp.parks.ca.gov

November 21, 2003

REPLY TO: FAA030918A

Michon Washington, Environmental Specialist
Commercial Space Transportation
Federal Aviation Administration
800 Independence Avenue, S.W. Room 331
WASHINGTON DC 20591

Re: Mojave Airport Launch Site Operator License, Mojave, Kern County, California.

Dear Ms. Washington:

Thank you for submitting to our office your November 2003 letter in response to my letter of October 21, 2003 letter regarding the Mojave Airport's proposed licensing for the operation of a launch site for horizontally launched, suborbital, reusable launch vehicles near the town of Mojave in Kern County. In order to conduct commercial launch operations, the Mojave Airport must obtain a license from the Federal Aviation Administration (FAA). A launch site operator license remains in effect for five years from the date of issuance unless surrendered, suspended, or revoked before expiration of the term and is renewable upon application of the licensee. The launch operations would involve launch vehicles with the following capabilities:

- Concept A - launch vehicle consisting of a carrier aircraft and an orbital launch vehicle. The carrier aircraft would take off from the existing runway at Mojave Airport and carry the launch vehicle to a designated altitude. Rocket engines on the launch vehicle would fire and the carrier aircraft would return to the Airport and land on the runway. The launch vehicle would climb until the rocket propellant is consumed and would then descend and glide to a horizontal landing on the airport runway.

- Concept B - launch vehicle would take off horizontally from the existing runway and would climb until the propellant is consumed. The launch vehicle would then descend and glide to a horizontal landing on the Airport runway.

FAA is seeking my comments on its determination of the effects of the proposed project on historic properties in accordance with 36 CFR 800, regulations implementing Section 106 of the National Historic Preservation Act. My review of the submitted documentation leads me to concur with FAA's determination that the proposed project will have no effect on historic properties.

Thank you again for seeking my comments on your project. If you have any questions, please contact staff historian Clarence Caesar at (916) 653-8902.

Sincerely,

Dr. Knox Mellon
State Historic Preservation Officer

U.S. Department of Transportation
Federal Aviation Administration

Commercial Space Transportation

800 Independence Ave., S.W, Room 331
Washington, D.C. 20591

SEP 16 2003

Judy Hohman
Division Chief, Mojave Desert/Great Basin
U.S. Fish and Wildlife Service
Ventura Field Office
Ventura, CA 93003

Re: Mojave Airport Launch Site Operator License

Dear Ms. Hohman:

The Mojave Airport, a General Aviation Airport, proposes to operate a launch site for horizontally launched, suborbital, reusable launch vehicles. This proposed action includes only the launch and landing of these vehicles on existing runways and does not include any construction or renovation to any buildings or facilities. In order to conduct commercial launch operations, the Mojave Airport must obtain a license from the Federal Aviation Administration (FAA).

Under the proposed action, the FAA would issue a launch site operator license for the Mojave Airport to operate a launch facility. A launch site operator license remains in effect for five years from the date of issuance unless surrendered, suspended, or revoked before the expiration of the term and is renewable upon application by the licensee (14 Code of Federal Regulations [CFR] 420.43). The licensing of launch site operations is a federal action subject to the requirements of the National Environmental Policy Act (NEPA). Since the proposed project would take place in the state of California, the project is also subject to the requirements of the California Environmental Quality Act (CEQA). The FAA is therefore in the process of preparing an Environmental Assessment that will address both NEPA and CEQA requirements. The Mojave Airport is implementing this project in Kern County, Mojave, California. A location map is enclosed which shows the location of the project.

To assist in assessing any potential environmental impacts of this project, we are requesting a list of any species listed or proposed to be listed as threatened or endangered under the Endangered Species Act in the area and whether critical habitat has been designated on the Mojave Airport property. Included with this letter is a map of the region of influence surrounding the Mojave Airport and a return shipping label. Please

indicate any critical habitat that falls within the region of influence on the area map and return the map via mail to the address indicated on the shipping label.

Thank you for your assistance in this matter. If you require further information to complete this request, please contact me at 202-267-9305.

Sincerely,

Michon Washington
Environmental Specialist

Cc: Daphne Fuller, FAA
Karen Northcutt, Northcutt and Associates

Enclosure as stated

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ventura Fish and Wildlife Office
2493 Portola Road, Suite B
Ventura, California 93003

In Reply, Refer To: PAS # 925.1028.1353

December 8, 2003

Michon Washington
Environmental Specialist
Federal Aviation Administration
800 Independence Ave., S.W., Room 331
Washington, D.C. 20591

Subject: Species List for Proposed Mojave Airport Launch Site, Kern, Los Angeles, and San Bernardino Counties, California

Dear Ms. Washington:

We are responding to your request, dated October 27, 2003, and received in our office via fax on October 27, 2003, for a list of endangered and threatened species that may occur in the vicinity of the Mojave Airport, Kern County, and surrounding regions of influence. The surrounding regions of influence include San Bernardino County and the northeastern portion of Los Angeles County. We have also enclosed a map outlining critical habitat for the threatened desert tortoise (*Gopherus agassizii*). No critical habitat is located on Mojave Airport property. We understand the Federal Aviation Administration(FAA) is the lead federal agency for this project, and that it would assume responsibility under section 7 of the Endangered Species Act (Act) of 1973, as amended.

The Mojave Airport, a General Aviation Airport, proposes to operate a launch site for horizontally launched, suborbital, reusable launch vehicles. This proposed action includes only the launch and landing of suborbital vehicles on existing runways and does not include any construction or renovation to any buildings or facilities.

This response fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Act. The FAA has the responsibility to review its proposed activities and determine whether any listed species may be affected. If the project is a construction project which may require an environmental impact statement[1/], the FAA has the responsibility to prepare a biological assessment to make a determination of the effects of the action on the listed species or critical habitat. If the FAA determines that a listed species or critical habitat is likely

[1/] "Construction project" means any major Federal action which significantly affects the quality of the human environment designed primarily to result in the building of structures such as dams, buildings, roads, pipelines, and channels. This includes Federal actions such as permits, grants, licenses, or other forms of Federal authorizations or approval which may result in construction.

to be adversely affected, it should request, in writing through our office, formal consultation pursuant to section 7 of the Act. Informal consultation may be used to exchange information and resolve conflicts with respect to threatened or endangered species or their critical habitat prior to a written request for formal consultation. During this review process, the FAA may engage in planning efforts but may not make any irreversible commitment of resources. Such a commitment could constitute a violation of section 7(d) of the Act.

Federal agencies are required to confer with the Service, pursuant to section 7(a)(4) of the Act, when an agency action is likely to jeopardize the continued existence of any proposed species or result in the destruction or adverse modification of proposed critical habitat (50 CFR 402.10(a)). A request for formal conference must be in writing and should include the same information that would be provided for a request for formal consultation. Conferences can also include discussions between the Service and the Federal agency to identify and resolve potential conflicts between an action and proposed species or proposed critical habitat early in the decision-making process. The Service recommends ways to minimize or avoid adverse effects of the action. These recommendations are advisory because the jeopardy prohibition of section 7(a)(2) of the Act does not apply until the species is listed or the proposed critical habitat is designated. The conference process fulfills the need to inform Federal agencies of possible steps that an agency might take at an early stage to adjust its actions to avoid jeopardizing a proposed species.

The Migratory Bird Treaty Act (16 U.S.C. 703-712) prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by the Department of the Interior. While the Act has no provision for allowing unauthorized take, it must be recognized that some birds may be killed at structures such as communications towers even if all reasonable measures to avoid it are implemented. The Service's Division of Law Enforcement carries out its mission to protect migratory birds not only through investigations and enforcement, but also through fostering relationships with individuals and industries that proactively seek to eliminate their impacts on migratory birds. While it is not possible under the Act to absolve individuals or companies from liability if they follow these recommended guidelines, the Division of Law Enforcement and Department of Justice have used enforcement and prosecutorial discretion in the past regarding individuals or companies who have made good faith efforts to avoid the take of migratory birds.

Candidate species are those species presently under review by the Service for consideration for federal listing. Candidate species should be considered in the planning process because they may become listed or proposed for listing prior to project completion. Preparation of a biological assessment, as described in section 7(c) of the Act, is not required for candidate species. If early evaluation of your project indicates that it is likely to affect a candidate species, you may wish to request technical assistance from this office.

The take of candidate species is not prohibited by the Act, however, we encourage you to consider their conservation in your planning process in the event they are listed prior to project completion. For information on other species of concern that may occur in the project area, the

Service recommends that you review information in the California Department of Fish and Game's (CDFG) Natural Diversity Database and that you contact CDFG at (916)324-3812.

If you have any questions regarding this letter, please contact Robert McMorran of my staff at (805) 644-1766.

Sincerely,

Judy Holman

Judy Holman
Division Chief
Mojave/Great Basin Desert

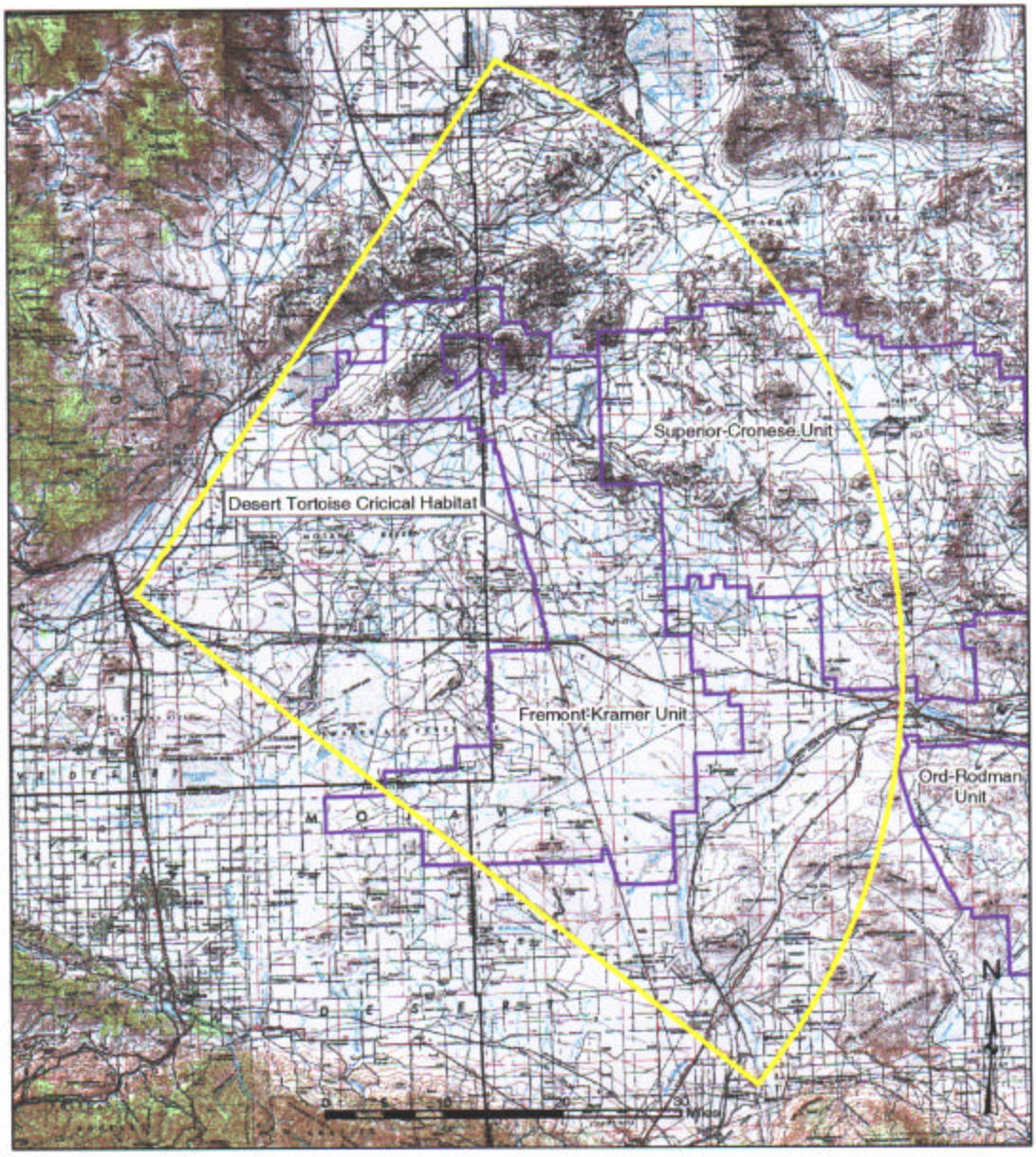
Enclosure(s)

LISTED, PROPOSED, AND CANDIDATE SPECIES WHICH MAY OCCUR IN THE VICINITY OF MOJAVE AIRPORT LAUNCH SITE, KERN COUNTY, LOS ANGELES COUNTY, AND SAN BERNARDINO COUNTY, CALIFORNIA

AMPHIBIANS		
California Red-Legged Frog	*Rana aurora draytonii*	T
Arroyo Toad	*Bufo californicus*	E
REPTILES		
Desert Tortoise	*Gopherus agassizii*	T,CH
FISH		
Mojave Tui Chub	*Gila bicolor mohavensis*	E
BIRDS		
Bald Eagle	*Haliaeetus leucocephalus*	T
California Condor	*Gymnogyps californianus*	E,CH
Least Bell's Vireo	*Vireo bellii pusillus*	E
Southwestern Willow Flycatcher	*Empidonax traillii extimus*	E
Yellow-Billed Cuckoo	*Coccyzus americanus*	C
PLANTS		
Cushenberry Buckwheat	*Erigonum ovalifolium var. vineum*	E
Cushenberry Milkvetch	*Astragalus albens*	E
Kelso Creek Monkeyflower	*Mimulus shevockii*	PE
Lane Mountain Milkvetch	*Astragalus jaegerianus*	E
Parish's Daisy	*Erigeron parishii*	T

Key:
E - Endangered T - Threatened CH - Critical habitat
PE - Taxa proposed for listing as endangered
C - Candidate species for which the Fish and Wildlife Service has on file sufficient information on the biological vulnerability and threats to support proposals to list as endangered or threatened.

MOJAVE AIRPORT LAUNCH REGION OF INFLUENCE



W:/SPECIES_DATA/DESERT_TORTOISE/FAA_MOJAVE_AIRPORT_LAUCH.MXD

VENTURA FISH & WILDLIFE OFFICE GIS DECEMBER, 2003

This Page Intentionally Left Blank

U.S. Department
of Transportation

Commercial Space Transportation

800 Independence Ave., S.W, Room 331
Washington, D.C. 20591

Federal Aviation
Administration

December 18, 2003

Judy Hohman
Division Chief
Ventura Fish and Wildlife Office
2493 Portola Road Suite B
Ventura, CA 93003

Dear Ms. Hohman:

The Mojave Airport, a General Aviation Airport, proposes to operate a launch site for horizontally launched, suborbital reusable launch vehicles. This proposed action includes only the launch and landing of these vehicles from existing runways and does not include construction or renovation to any buildings or facilities. The FAA considered impacts to biological resources in the *Draft Environmental Assessment/Initial Study for the East Kern Airport District Launch Site Operator License for the Mojave Airport,* which was delivered to the California State Clearinghouse on November 3, 2003. The Environmental Assessment/Initial Study can be viewed at http://ast.faa.gov/lrra/EA_Mojave.htm. After analyzing the proposed action and reviewing the list of species provided by your office, the FAA has determined that the proposed action would not adversely affect listed, proposed, or candidate species or critical habitat.

On September 16, 2003 the FAA requested documentation of species listed, proposed, or identified as candidate species under the Endangered Species Act occurring in the Region of Influence and whether critical habitat has been designated for these species. On October 27, 2003 the FAA resubmitted this request. Correspondence from your office dated December 8, 2003, indicated that species in the attached table may occur in the Region of Influence.

The USFWS has designated Desert Tortoise Critical Habitat within the Region of Influence for this proposed project. A nominal flight conducted as part of the proposed action would not impact any listed, proposed, or candidate species or the designated critical habitat. During a nominal mission only a small portion of the Region of Influence would be overflown and the vehicles would not impact the ground other than on the runways at the Mojave Airport. In addition, noise associated with launch and flight of the proposed vehicles would not be expected to have a significant impact on species or habitat that may occur within the Region of Influence including that of the Desert Tortoise. In general, noise levels produced by launches would be significantly less than those produced by existing aircraft in the region, and launches would occur

infrequently over the course of a year. Therefore, these short-term noise impacts associated with launch activities would be less than significant.

A non-nominal flight could result in the crash and breakup of a proposed vehicle in the Region of Influence. However, because the probability of a crash is low, impacts to biological resources including listed, proposed, and candidate species and critical habitat as a result of vehicle crash would not be anticipated.

After analyzing the proposed action and reviewing the list of species provided by your office, the FAA has determined that the proposed action would not adversely affect listed or candidate species or critical habitat. Formal consultation under Section 7 of the Endangered Species Act does not appear to be warranted for this proposed action. The FAA is requesting your comments on this determination. If we do not hear from you within 30 days, we will assume that you concur with our determination and will proceed accordingly. Thank you for your assistance in this matter. If you require further information to complete this request, please contact me at 202-267-9305.

Sincerely,

Michon L. Washington
FAA Environmental Specialist

Cc: Robert McMorran, USFWS
Daphne Fuller, FAA
Karen Northcutt, Northcutt and Associates

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ventura Fish and Wildlife Office
2943 Portola Road, Suite B
Ventura, California 93003

IN REPLY REFER TO
FWS/R8.1028.1502

January 23, 2004

Michon Washington
Environmental Specialist
Federal Aviation Administration
800 Independence Avenue, S.W., Room 331
Washington, D.C. 20591

Subject: Concurrence Letter for Proposed Mojave Airport Launch Site, Kern, Los Angeles, and San Bernardino Counties, California

Dear Ms. Washington:

We are responding to your December 18, 2003, letter requesting our concurrence regarding the effects of the subject project on listed species and critical habitat. The Mojave Airport, a General Aviation Airport, is proposing to operate a launch site for horizontally launched, suborbital, reusable launch vehicles. We recognize the Federal Aviation Administration (FAA) as the lead Federal agency responsible for consultation under Section 7 of the Endangered Species Act of 1973, as amended (Act). The FAA has determined that the subject project is not likely to adversely affect any listed species or its critical habitat within the Mojave Airport and the FAA's determination of surrounding regions of influence. The surrounding regions of influence include San Bernardino County and the northeastern portion of Los Angeles County.

The proposed project would be accomplished within the boundary of the Mojave Airport located in Kern County. Chain-link fence surrounds the facility, and there is no critical habitat located within Mojave Airport property. The proposed action includes only the launch and landing of suborbital vehicles on existing runways and does not include any construction or renovation to existing buildings or facilities. Take-off and landing of the suborbital vehicle will be like that of typical aircraft.

As a protective measure for desert tortoise (*Gopherus agassizii*) that may be within the Mojave Airport fence, the FAA will survey the runway prior to take-off and landing (Michon Washington, Environmental Specialist, FAA, pers. comm., January 2004).

The Service responsibilities include administering the Act, including sections 7, 9, and 10. Section 9 of the Act prohibits the taking of any federally listed endangered or threatened species. Section 3(18) of the Act defines "take" to mean "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." Service regulations (50 CFR 17.3) define "harm" to include significant habitat modification or degradation which actually kills or injures wildlife by significantly impairing essential behavioral patterns,

including breeding, feeding or sheltering. Harassment is defined by the Service as an intentional or negligent action that creates the likelihood of injury to listed species by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. The Act provides for civil and criminal penalties for the unlawful taking of listed species. Exemptions to the prohibitions against take may be obtained through coordination with the Service in two ways: through interagency consultation for projects with Federal involvement pursuant to section 7 or through the issuance of an incidental take permit under section 10(a)(1)(B) of the Act.

The Migratory Bird Treaty Act (16 U.S.C. 703-712) prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by the Department of the Interior. While the Act has no provision for allowing unauthorized take, it must be recognized that some birds may be killed at structures such as communications towers even if all reasonable measures to avoid it are implemented. The Service's Division of Law Enforcement carries out its mission to protect migratory birds not only through investigations and enforcement, but also through fostering relationships with individuals and industries that proactively seek to eliminate their impacts on migratory birds. While it is not possible under the Act to absolve individuals or companies from liability if they follow these recommended guidelines, the Division of Law Enforcement and Department of Justice have used enforcement and prosecutorial discretion in the past regarding individuals or companies who have made good faith efforts to avoid the take of migratory birds.

We concur with your determination that the proposed project is not likely to adversely affect any listed species or critical habitat. We base our concurrence on the following: 1) the proposed action includes only the launch and landing of suborbital vehicles on existing runways and does not include any construction or renovation to existing buildings or facilities, 2) existing runways do not contain any habitat necessary for the survival of listed species, 3) no critical habitat is designated within the Mojave Airport, 4) the FAA will survey the runways prior to take-off and landing of the suborbital vehicle, and 5) discountable effects. Discountable effects are those events that are extremely unlikely to occur. Such events could include the presence of desert tortoise on existing runways, a crash, or any other unforeseen circumstance that would potentially take a listed species or cause adverse modification to critical habitat. If any discountable effects occur, the FAA will contact the Service for an emergency consultation. Section 7 regulations recognize that an emergency consultation (natural disaster or other calamity) may require expedited consultation (50 CFR §402.05). Please be aware that this letter does not authorize the take of any listed species. If a desert tortoise wanders onto the project area, all activities must stop until the animal has left the area and the Service is notified.

If you have any questions regarding this matter, please contact Robert McMorran of my staff at (805) 644-1766.

Sincerely,

Judy Holman

Judy Holman
Division Chief/ Mojave/Great Basin Deserts

11. Distribution List

State Clearinghouse

Mr. Terry Roberts
Office of Planning and Research
State Clearinghouse
1400 Tenth Street, Room 222
Sacramento, CA 95812

Libraries

Edwards AFB Base Library
95 SPTG/SVMG
5 West Yeager Blvd.
Building 2665
Edwards AFB, CA 93524-1295

Kern County Library
Boron Branch
26967 20 Mule Team Road
Boron, CA 93516

Kern County Library
California City Branch
9507 California City Boulevard
California City, CA 93505

Kern County Library
Mojave Branch
16916-1/2 Highway 14
Mojave, CA 93501

Kern County Library
Tehachapi Branch
450 West F Street
Tehachapi, CA 93561

Kern River Valley Library
7054 Lake Isabella Boulevard
Lake Isabella, CA 93240
Attn: Karen Leifeld, Branch Supervisor

Kern River Valley Library
Wanda Kirk Brand (Rosamond)
3611 Rosamond Boulevard
Rosamond, CA 93560

Palmdale City Library
700 E. Palmdale Boulevard
Palmdale, CA 93550

Federal Agencies

Don L. Klima, Director Office of Federal Programs
U.S. Advisory Council on Historic Preservation
1100 Pennsylvania Avenue, NW, Suite 803
Washington, DC 20004

Debra Trindle
Federal Aviation Administration
Office of Air Traffic Airspace Management (ATA-9)
Military Liaison
800 Independence Avenue, SW
Washington DC 20591

Charles Lieber
Federal Aviation Administration
Western Pacific Region
Airspace Management Branch
1500 Aviation Boulevard
Lawndale, CA 90261

David Kessler
FAA Western Pacific Region
PO Box 92007
1500 Aviation Blvd
Hawthorne, CA 90261

Matt McMillan
FAA Office of Environment and Energy
800 Independence Avenue, SW
Washington, DC 20591

Keith Dyas
Edwards Air Force Base
AFFTC/EM
1 S. Rosamond Blvd.
Edwards AFB, CA 93524

Dwight Deakin
Edwards Air Force Base
AFFTC/XPX
1 S. Rosamond Blvd.
Edwards AFB, CA 93524

China Lake Naval Weapons Center
Commanding Office (83KBOOD)
Naval Air Weapons Station
China Lake, CA 93555-6001

D. Bambi Kraus
President
National Association of Tribal Historic Preservation Officers (NATHPO)
P.O. Box 19189
Washington, DC 20036-9189

U.S. Fish and Wildlife Service
Endangered Species Program
4401 N. Fairfax Drive, Room 420
Arlington, VA 22203

Judy Hohman
Division Chief, Mojave Desert/Great Basin
U.S. Fish and Wildlife Service
Ventura Field Office
2493 Portola Road, Suite B
Ventura, CA 93003

U.S. Department of Interior
Bureau of Land Management
Ridgecrest Field Office
300 South Richmond Road
Ridgecrest, CA 93555

U.S. Environmental Protection Agency
Region IX Office
75 Hawthorn Street
San Francisco, CA 94105

U.S. Fish and Wildlife Service
San Joaquin Valley Branch Chief
2800 Cottage Way #W-2605
Sacramento, CA 95825-1846

Congressional Delegation

U.S. Senate
The Honorable Barbara Boxer
112 Hart Senate Office Building
Washington, DC 20515

The Honorable Diane Feinstein
331 Hart Senate Office Building
Washington, DC 20515

U.S. House of Representatives
Cal Dooley – 20th District
1201 Longworth HOB
Washington, DC 20515

Devin Nunes – 21st District
1017 Longworth HOB
Washington, DC 20515

Williams M. Thomas
2208 Rayburn House Office Building
Washington, DC 20515

State of California Officials

Governor's Office

The Honorable Arnold Schwarzeneggar
Governor of California
State Capital Building
Sacramento, CA 95814

California State Senate

Charles Poochigian – 14th District
State Capitol, Room 5087
Sacramento, CA 95814

Dean Florez – 16th District
State Capitol, Room 4090
Sacramento, CA 95814

William J. "Pete" Knight – 17th District
State Capitol, Room 5082
Sacramento, CA 95814

California State Assembly

Nicole M. Parra – 30th District
State Capitol
P.O. Box 942849
Sacramento, CA 94249

Kevin McCarthy – 32nd District
State Capitol, Room 4116
Sacramento, CA 94249

Bill Maze – 34th District
State Capitol, Room 2002
Sacramento, CA 94249

California State Agency

David Cohen
California Department of Transportation
Division of Aeronautics
1120 N Street, MS#40
Sacramento, CA 95814

Carolyn Yee
California Department of Transportation/District 9
500 South Main Street
Bishop, CA 93514

Local Agencies

Stuart Witt, General Manager
East Kern Airport District
1434 Flight Line
Mojave, CA 93501

California City Planning
21000 Hacienda Boulevard
California City, CA 93515

City of Tehachapi
115 South Robinson Street
Tehachapi, CA 93561-1722

Los Angeles County
Department of Regional Planning
320 West Temple Street, Room 1390
Los Angeles, CA 90012

San Bernardino County
Office of Planning
385 North Arrowhead Ave, 3rd Floor
San Bernardino, CA 92415

Kern County Airport
1401 Skyway Drive
Suite 220
Bakersfield, CA 93308

Kern County Air Pollution Control District
2700 M Street, Suite 302
Bakersfield, CA 93301

Kern County Administrative Officer
1115 Truxtun Avenue
Fifth Floor
Bakersfield, CA 93301

Kern County Engineering & Survey Svs/Floodplain
2700 M Street, Suite 570
Bakersfield, CA 93301

Kern County Environmental Health Services Department
2700 M Street, Suite 300
Bakersfield, CA 93301

Kern County Fire Department
2700 M Street
Bakersfield, CA 93301

Kern County Sheriff's Department
1350 Norris Road
Bakersfield, CA 93308

Kern County Roads Department
2700 M Street, Suite 400
Bakersfield, CA 93301

Kern County Waste Management Department
2700 M Street, Suite 500
Bakersfield, CA 93301

Mojave Unified School District
3500 Douglas
Mojave, CA 93501

Kern COG
1401 19th Street
Bakersfield, CA 93301

Antelope Valley-East Kern Water Agency
6500 West Avenue N
Palmdale, CA 93551

Mojave Public Utility District
15844 K Street
Mojave, CA 93501

National Audubon Society
711 University Ave
Sacramento, CA 95825-6708

Desert Tortoise Preserve Committee
4067 Mission Inn Avenue
Riverside, CA 92501

Native American Heritage Council of Kern County
P.O. Box 1507
Bakersfield, CA 93302

Southern California Edison Planning Department
510 S. China Lake Blvd
Ridgecrest, CA 93555

Southern California Edison Planning Department
421 West J Street
Tehachapi, CA 93561

Southern California Gas Company
1510 North Chester Avenue
Bakersfield, CA 93308

Southern California Gas Company
Attn David Reed, Trans. Dept.
9400 Oakdale Avenue
Chatsworth, CA 91313-6511

Southern San Joaquin Valley
Archaeological Information Center
California State University
9001 Stockdale Highway
Bakersfield, CA 93309

Kern County Planning Department
2700 M Street, Suite 100
Bakersfield, CA 93301

Mr. Don Maben, Supervisor
2nd District, Kern County
1115 Truxtun Avenue, Fifth Floor
Bakersfield, CA 93301

Mr. Jon McQuiston, Supervisor
1st District, Kern County
1115 Truxtun Avenue, Fifth Floor
Bakersfield, CA 93301

Appendix A. Transcript from Public Hearing, Mojave, California

DRAFT ENVIRONMENTAL ASSESSMENT/INITIAL STUDY

FOR THE EAST KERN AIRPORT DISTRICT

LAUNCH SITE OPERATOR LICENSE

FOR THE MOJAVE AIRPORT

PUBLIC HEARING

DATE: WEDNESDAY, DECEMBER 10, 2003

MEETING TIME: 6:00 P.M.

MEETING PLACE: MARIAH COUNTRY INN

MOJAVE, CALIFORNIA

Reported By: Natalie Davies, CSR No. 12311

APPEARANCES

The Office of Commercial Space Transportation at the Federal Aviation Administration:	MICHON WASHINGTON Environmental Specialist PATRICK HOAR Engineer with the Licensing and Safety Division SHELIA HELTON-INGRAM Airspace Program Manager
General Public Speakers:	Bill Deaver Aleta Jackson Dick Rutan Doug Jones Cathy Hansen Michele Behrens Dan Delong

MOJAVE, CALIFORNIA;

WEDNESDAY, DECEMBER 10, 2003; 6:00 P.M.;

MARIAH COUNTRY INN

MS. WASHINGTON: Good evening, everyone.

And welcome to the public hearing for the Draft Environmental Assessment, EA, and Initial Study for the proposed East Kern Airport District Launch Site Operator Licence for the Mojave Airport.

My name is Michon Washington, and I'm an environmental specialist in the Office of Commercial Space Transportation at the Federal Aviation Administration, the FAA.

I would like to introduce Patrick Hoar, who is one of our licensing and safety engineers; and Shelia Helton-Ingram, who is our airspace and air traffic manager -- program manager.

And I'd like to thank you all for coming tonight. It is our goal to provide you with an overview of the proposed activities under consideration at Mojave.

Come on in.

The purpose of tonight's meeting is to gather comments from you on the proposed additional use of the Mojave Airport as a facility for launching and landing reusable aerospace vehicles.

We've developed a Draft Environment Assessment for the proposed operation of the launch facility and want to incorporate your thoughts and concerns on this project in our environmental analysis. We want this to be an open and collaborative process in which you will be directly involved.

Our agenda tonight is on the screen to ensure that we give you a good overview of the proposed activities and solicit your comments and thoughts. We will use the following agenda for tonight's meeting.

Following this short, fifteen-minute presentation, there will be a five-minute break so we can set up a record to record public statements for anyone wishing to provide one. And there are several people who have already signed up to do so.

Following the public statements, myself and the FAA staff here will be available to respond to questions regarding clarification of the information that's being presented here during the presentation.

At the end of this presentation, we encourage you to give a public statement. You will be allotted five minutes to do so. In order to make sure we give everyone an opportunity to speak, anyone who is interested in providing a public statement should sign up at the registration table, which is right out in the

hallway.

The purpose of this meeting, again, is to gather your comments; and, therefore, we will note all of your comments. However, we will not respond directly to questions or any issues raised at this time. If you do not wish to give an oral statement, you may fill out a written statement sheet and turn that in at the registration table, as well.

To ensure that your comments are adequately considered in the Final EA, they must be received no later than December the 12th. The FAA will consider all comments, whether written or oral, in prep- -- in preparation of the Final EA.

As a little background, the FAA, Associate Administrative for Commercial Space Transportation is responsible for licensing U.S. commercial launches, reentries, and the operation of launch and reentry sites.

The environmental review portion of the licensing process ensures that any significant impacts of commercial space launch activities on the natural and human environment are fully considered in the decision-making process.

The FAA must consider protection of the public, property, the national security, the foreign policy interests of the United States. Each applicant

proposing to launch a reusable launch vehicle from Mojave Airport will need to obtain the proper FAA license.

As part of the environmental review portion of the licensing process, the FAA is responsible for preparing appropriate environmental documentation, such as Environmental Assessments and Environment Impact Statements. On this project the FAA is the lead Federal agency for preparing the environmental analysis.

The U.S. Air Force operates Edwards Air Force Base, which is adjacent to the Mojave Airport. Coordination and protocols already exist to permit airplanes taking off and landing at the Mojave Airport to use the airspace over Edwards Air Force Base. In addition, the U.S. Air Force uses the Mojave Airport for missions. Edwards Air Force Base is responsible for the management of the airspace that would be used by the launch vehicles proposed to be launched from Mojave.

Therefore, the FAA has requested and the Air Force has agreed to participate as a cooperating agency in the preparation of the environmental analysis for this proposed action. The East Kern Airport District, or EKAD, is the lead State agency for compliance with the California Environmental Quality Act, or CEQA.

In addition to the environmental review and determination, a launch-site operator licensed applicant must complete a policy review and approval, safety review and approval, payload review and determination, and a financial responsibility determination.

The policy review and approval process determines whether the information in the license application presents any issues affecting U.S. national security or foreign policy interests.

The safety review and approval process determines whether an applicant can safely conduct the launch of the proposed launch vehicle and any payload.

The payload review and determination establishes whether a licensed applicant or payload owner or operator has obtained all required licenses, authorizations, and permits.

The financial responsibility determination ensures that all commercial licensees demonstrate financial responsibility to compensate for maximum probable loss from claims by a third party for death, bodily injury, or property damage resulting from their launch activities.

These reviews must be completed prior to issuing a launch license.

Licensing launches and the operation of a

launch site is a Federal action subject to the requirements of the National Environmental Policy Act, or NEPA. NEPA declares a broad commitment to protect, restore, and enhance the environment and requires that Federal agencies consider the environmental consequences of their proposed actions.

The FAA determined that an EA should be prepared to evaluate the potential impacts of this proposed project because the preparation of an Environmental Impact Statement did not appear to be warranted. An EA contains a detailed analysis of environmental consequences of proposed actions and reasonable alternatives as well as cumulative impacts.

Before a license can be issued, the FAA will make a decision on the proposed action. No action can be taken on the proposed project until that -- until that determination is made.

Because the proposed action would take place in California, it is also necessary to meet CEQA requirements. The EKAD is the lead agency for the CEQA process.

This Draft EA will serve as the Initial Study for CEQA. The Initial Study is prepared to determine whether it is necessary to prepare an Environmental Impact Report or a Negative Declaration.

In this instance, EKAD is proposing to adopt a Negative Declaration. After the public review period ends on December the 12th, public comments will be incorporated into the Final EA. EKAD will meet on December the 16th to make a decision on whether or not to adopt the Negative Declaration.

The FAA has prepared the Draft EA, which was released for public review on October the 31st, 2003. The Notice of Availability and Request for Comment on the Draft EA was published in the Federal Register on November the 6th, 2003. A Notice of Intent to Adopt a Negative Declaration was also released to the public for comment to meet the CEQA requirement.

The FAA is now in the process of receiving information and feedback from the public, Native American groups, nonprofit entities, Federal, State, and local agencies on the proposed action and alternatives. All comments will be addressed in the Final EA, which is expected to be released in January 2004.

To ensure that all relevant issues are addressed in the Final EA, comments must be received by the FAA no later than December the 12th, 2003.

After considering all comments, the FAA will make a decision on the proposed action. Once the Final EA is completed, the Executive Summary will be

mailed to people who request a copy. In addition, the Final EA will be made available electronically on CD-ROM and on the FAA website for electronic download. Paper copies of the Final EA will be available for review at your local libraries and the EKAD office located at the Mojave Airport.

Please note that successful completion of the environmental review process does not guarantee that a license will be issued by the FAA. The project must still meet all FAA safety, risk, and indemnification requirements.

The proposed action for this Draft EA/Initial Study is for the FAA to issue a launch-site operator license to EKAD for the Mojave Airport. The Draft EA/Initial Study addresses the overall impact to the environment of the proposed operations anticipated for the five-year period encompassing the FAA's launch site operator's license. This includes the launch of horizontally launched, suborbital reusable launch vehicles, the subsequent landing of the reusable launch vehicles, and any related activities such as static engine firing, launch vehicle manufacturing, and other testing and manufacturing activities. The Draft EA/Initial Study also addresses the impacts of the launch of two specific launch vehicle

concepts.

The FAA does not license the vehicle, itself, or the ground tests of rocket engines, only the launch of the vehicle and the operation of the launch site. This EA may be used as the basis for making a determination about the environmental impacts of launches of individual proposed launch vehicles from the Mojave Airport.

The EKAD has identified two types of vehicles that is presented in this analysis as Concept A and Concept B, which would be typical of the vehicles that would operate from the Mojave Airport. The proposed action/preferred alternative would include launches of both Concept A and Concept B launch vehicles.

Concept A vehicles include air-drop designs where two vehicles, an airplane and a launch vehicle, are mated together. The airport carries the launch vehicle to a predetermined altitude where the launch vehicle is dropped and its rocket engines ignite.

Concept B vehicles include horizontally launched vehicles that use rocket power to take off from a standard aviation runway.

The Draft EA/Initial Study identifies and considers reasonable alternatives to accomplish the goals of the proposed action. The range of alternatives

considered includes: the preferred alternative, the no-action alternative, and alternatives to the proposed action.

For this project the no-action alternative would be for FAA to not issue a launch-site operator license to EKAD. If the FAA were to decide to implement the no-action alternative, EKAD would not be able to operate a commercial launch facility at the Airport. The Mojave Airport would continue to be available for existing aviation-related activities.

The FAA considered two alternatives to the proposed action in this Draft EA/Initial Study. The first alternative would be to issue a launch-site operator license to EKAD for the operation of a facility to launch only Concept A vehicles. The second alternative would be to issue a launch-site operator license for the operation of a facility to launch only Concept B vehicles.

The Region of Influence for this project would cover approximately 3800 square miles and would include portions of Kern, Los Angeles, and San Bernardino Counties. However, the Region of Influence for any one launch from the Mojave Airport would be significantly smaller and would vary based on the proposed flight path.

The Region of Influence also includes parts

of Edwards Air Force Base and China Lake Naval Air Weapons Station North and South Ranges. The Region of Influence would be primarily contained within an airspace area, created by the Department of Defense and the FAA, called the Joint Service Restricted R-2508 Complex, which restricts and controls nonmilitary air traffic.

The Mojave Airport is owned and operated by EKAD, a special district with an elected Board of Directors and a General Manager. The Mojave Airport was formerly a military base and is currently the largest general aviation airport in Kern County.

The airport serves as a civilian test flight center, the location of the National Test Pilot School, and as a base for modifications of military jets and civilian aircraft. The Mojave Airport also includes an aircraft storage and reconditioning facility and is home to several industrial operations, such as BAE Systems, Fiberset, Scaled Composites, AVTEL, XCOR, Orbital Sciences, and General Electric.

The Mojave Airport comprises an area of approximately 3,000 acres. There is open land to the north and the east and the industrial/commercial uses on the south side of the Airport.

Major facilities within the Airport include the terminal and industrial areas located in the southern

portion of the airfield, hangars, offices, maintenance shop, and fuel service facilities. Rocket engine test stands are located in the northern portion of the Airport property. Aircraft parking capacity includes 600 tie-downs and 60 T-hangars. The Mojave Airport also consists of three runways with associated taxiways and other support facilities.

No airport modifications are currently planned to accommodate the proposed launch of the vehicles at Mojave Airport.

NEPA requires that decision-makers consider environmental issues as part of their planning process. Decision-makers must know what issues need to be addressed.

The FAA examined environmental impacts associated with the proposed action and alternatives, including the no-action alternative, on the resource areas listed on the screen.

As I stated previously, no construction activities are planned under the proposed action, and no additional personnel would be added to the Mojave Airport to support proposed launch operations. All resource areas were found to have no impacts. In addition, no cumulative impacts would occur as a result of the proposed action.

The slide on the screen has the same information presented in one of the posters in the back of the room. Although there were no significant impacts found to any of the resource areas as a result of the proposed action, this poster summarizes potential impacts to resource areas that may be of particular interest to members of the community. I will address these resource areas in the next few slides, including air quality, noise, safety and health, and biological resources.

The proposed action would cause a small increase in air emissions at the Mojave Airport generated during launch/landing operations, ground operations, and any potential accidents; however, it would not increase levels enough to require a Federal conformity analysis.

None of the emissions resulting from the proposed action would expose the community of Mojave or sensitive receptors to substantial pollutant concentrations or objectionable odors beyond those fuel and exhaust odors that are already generated from airport operations.

The proposed launch activities are similar to current operations at Mojave; therefore, there would be no significant changes in current noise levels. Sonic booms may occur from the proposed launches. The noise

from sonic booms would be comparable to a pile driver at a construction site. At the maximum proposed operations level, the proposed action would only produce one additional sonic boom per week.

The proposed operations would not be different from current operations at the Airport; therefore, exposure to mechanical accidents would not differ significantly from the current levels. The proposed activities would result in increased vehicle traffic from launch participants, launch spectators, and increased propellant delivery trucks traveling to Mojave Airport.

However, the increase in traffic would be small, and no significant increase in accidents would be expected. There is an on-site fire department at the Mojave Airport that would respond to any accidents resulting from the proposed activity. Additional off-site emergency response capability is available, if needed.

The desert tortoise and the Mojave ground squirrel, which are listed by the U.S. Fish and Wildlife Service as threatened, have historically occurred through the Region of Influence. There is no critical habitat for the species designated in the Region of Influence. Because no construction activities are planned, no

substantial adverse effects, either directly or through habitat modifications, would be expected. The launch noise and sonic booms from proposed activities may elicit a startle response in wildlife in the area; however, no significant impacts or long-term adverse effects are expected.

If you would like to make written comments on the material discussed at tonight's meeting or on the Draft EA/Initial Study, please fill out one of the written comment forms and drop it off at the registration table before you leave this evening.

Written comments can also be faxed, e-mailed, or mailed to the FAA at the addresses listed on the screen. These addresses are also included on the comment forms. To ensure that your comments are adequately considered in the Final EA, they must be received no later than December 12th, 2003. Finally, comments can be submitted through the FAA website. Again, comments have to be received by December the 12th.

We encourage you to sign up to receive a paper copy of the Executive Summary of the Final EA, when it is available, by filling out the appropriate form at the sign-in table in the hallway. Hard copies of the Final EA, again, will be made available at community libraries and at the EKAD main office at Mojave Airport.

You may also request a CD-ROM of the Final EA or download it when it is available from the FAA website, and the website is listed on the screen.

If you would like to make a public statement at tonight's meeting, we encourage you to sign up at the registration table and fill out a speaker's card. Each speaker will be given five minutes to make a statement. We will record your comments through a court reporter to ensure that we accurately capture your comments.

The purpose of tonight's meeting is to collect your comments and thoughts on the proposed project; and, therefore, we will not be responding directly to your comments this evening. Oral and written comments will be given equal weight in preparing the Final EA.

It is important for you to understand that no decision on this project will be made tonight. Our role is to make sure that your concerns are considered in the preparation of the Environmental -- Final Environmental Assessment. Our primary function is to listen to your suggestions and concerns firsthand.

At this point we'll take a five-minute break to set up for public statements. If you have not done so, please use this time to fill out a speaker's

card at the registration table. Please also note that I and my support staff will be available to answer questions immediately following the public statements.

Thank you so much for coming and thank you for your time.

A short, five-minute break.

(Recess taken.)

MS. WASHINGTON: I would like to have our first speaker to come up, please.

Mr. Bill Deaver.

MR. DEAVER: I intend to set a precedent by keeping it short. My name is Bill Deaver, representing the Mojave Town Council and the Mojave Chamber of Commerce. Both of these organizations have gone on record in writing to the FAA in support of this project. I'm not going to read it tonight. A copy will be filed with the record.

Thank you.

MS. WASHINGTON: Thank you very much, Mr. Deaver.

Our second speaker, Aleta Jackson.

Oh, Aleta. I'm sorry, Aleta.

MS. JACKSON: Aleta Jackson, Mojave resident. I'm also a member of the Chamber of Commerce and founder of XCOR Aerospace.

I'm in favor of this, as you might imagine, because I think not only will it keep me in beans and worms, it will be a great benefit and boom to the area and to national security.

Thank you.

MS. WASHINGTON: Thank you very much, Ms. Jackson.

Our next speaker is Mr. Dick Rutan.

MR. RUTAN: My name is Dick Rutan, and I'm a -- what am I? -- the Director of -- I've just been elected to the Board of Directors for the East Kern Airport District and a longtime resident.

And my comment is -- is that I would like to -- to urge AST -- before I say that -- right -- we are on the -- this is an emerging industry, a rapidly developing, exciting industry with potential that we can't even imagine. And I would urge AST to develop an attitude of cooperation and support this industry and not bury it in bureaucratic minutia.

Thank you.

MS. WASHINGTON: Thank you, Mr. Rutan.

Our next speaker is Doug Jones.

MR. JONES: I'll decline to speak. There's nothing that I really need to say.

MR. WASHINGTON: Okay. Well, thank you,

Mr. Jones.

Our next speaker is Cathy Hansen.

MS. HANSEN: I'm Cathy Hansen, resident of Mojave and on the Board of Directors for the East Kern Airport District.

And I just -- this is so exciting because we're just on the edge of the future, and the very idea to become the first space port is very exciting.

I know that people will say, "Aren't launches usually made out over the ocean? And you're so far inland."

"Yes. That's right."

And that's what makes it so exciting that the -- the spacecraft that are launched here can either launch from the ground or be dropped from another aircraft. Of course, I'm very supportive of it because we need to look to the future.

I have grandchildren that will come running into the house and say, "Grandma, look what's up there." And they get very excited when they see a Burt Rutan-designed airplane. They always know it's one of Burt's airplanes. But that is the future. And I look at that excitement with these kids and think, "We need that kind of excitement as adults." So yes, I'm in favor of it.

Thank you very much for having this hearing.

MS. WASHINGTON: Thank you very much, Ms. Hansen.

Our next speaker is Michele Behrens.

MS. BEHRENS: I yield my time to the Honorable, Mr. Dan Delong.

MS. WASHINGTON: Okay. Well, then, Mr. Dan Delong, come on up.

MR. DELONG: I'm Dan Delong. I've been a Mojave resident for nine years, and I think Mojave is a great place to live. The town has just lost a significant revenue source in the building of a highway bypass, and I'm looking forward to this new industry that FAA can support to bring some more jobs back to Mojave instead of drying up and blowing away.

Thank you.

MS. WASHINGTON: Well, this concludes our formal portion of the meeting for the evening. I'd like to, again, just thank everybody for coming out and being so enthusiastic and giving up your personal time to come out and support this project.

We will be here. You can look at the posters. We'll be happy to, you know, discuss the posters with you and -- and answer any questions about

the information on the posters that we can.

So thank you so much.

(Whereupon the public hearing was concluded.)

STATE OF CALIFORNIA)
) ss.
COUNTY of KERN)

I, Natalie Davies, a Certified Shorthand Reporter for the State of California, holding Certificate No. 12311, do hereby certify that I was present and reported in stenotypy all the proceedings in the foregoing-entitled matter; and I further certify that the foregoing is a full, true and correct statement of such proceedings and a full, true and correct transcript of my stenotype notes thereof.

Dated this 23rd day of December, 2003, at California City, California.

Original Signed

_____
Natalie Davies, CSR No. 12311

Appendix B. Response to Comments

In accordance with NEPA and the implementing regulations of CEQ (40 CFR 1500-1508) the FAA initiated a public review and comment period for the Draft EA for the East Kern Airport District Launch Site Operator License for the Mojave Airport. The Mojave Airport would serve as an alternative location to Federal facilities or other commercial sites for launching horizontally launched, suborbital vehicles. The Mojave Airport already serves as a location to test aircraft and this would allow the EKAD to offer the Mojave Airport to existing customers wishing to conduct launch operations. These operations may include for-profit launch services. For-profit launch services may include tourism activities, selling merchandise flown in the vehicle, or other activities. These types of activities would be consistent with the objectives of the Commercial Space Launch Act.

Comments received regarding the Draft EA during the public comment period were categorized into three groups of submitters: Government Agencies, Industrial Organizations, and Public Citizens. Comments received from cooperating agencies and from the FAA are not included in the Comment Response Document, but were addressed in the Final EA. The comments were further categorized by subject matter and were each coded into one of the following topic areas: Safety, Miscellaneous, and Editorial.

This appendix of the Final EA for the EKAD Launch Site Operator License for the Mojave Airport is divided into sections based on the source of the comment. Each comment is addressed individually. The text provided by the commentor was not altered to correct for grammatical or spelling errors. Each comment was analyzed to determine the key topic addressed.

This Page Intentionally Left Blank

GOVERNMENT AGENCIES

1.0 Robert M. Snoddy, Kern Council of Governments

Kern Council
of Governments

December 11, 2003

Ms. Michon Washington,
FAA Environmental Specialist
Mojave Airport EA,
c/o ICF Consulting
9300 Lee Highway
Fairfax, VA 22031

Dear Ms. Washington,

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT/INITIAL STUDY
FOR THE EAST KERN AIRPORT DISCTRIC LAUNCH SITE
OPERATOR LICENSE FOR THE MOJAVE AIRPORT

Kern Council of Governments staff has reviewed the Draft Environmental Assessment / Initial Study for the East Kern Airport District Launch Site Operators License for the Mojave Airport, and we offer the following comments:

1. On page 7, you note the proposed launches may include tourism activity, and on page 142, launch spectators have been calculated to equal three passenger vehicles per launch. Given historical interest in aviation by residents of Kern County, three spectator vehicles per launch would appear low. On what basis was this assumption made? Were previous Mojave Airport events used or a study of a similar facility?

2. On page 74, you have referred to Kern Council of Governments as Kern Council of Government.

3. On page 76, you state construction for a realignment of State Route (SR) 58 was underway. The realignment of SR 58 has been completed and is in use.

We appreciate the opportunity to provide comments on your draft Environmental Assessment / Initial Study. If you have any questions, please call the undersigned at (661) 861-2191.

Sincerely,

Ronald E. Brummett
Executive Director

Robert M. Snoddy
Regional Planner III

REB/rms/lc

Kern Council of Governments
1401 19th Street, Suite 300, Bakersfield, California 93301 (661) 861-2191 Facsimile (661) 324-8215 TTY (661) 832-7433 www.kerncog.org

1.1 Comment 1 [Miscellaneous]

On page 7, you note the proposed launches may include tourism activity, and on page 142, launch spectators have been calculated to equal three passenger vehicles per launch. Given historical interest in aviation by residents of Kern County, three spectator vehicles per launch would appear low. On what basis was this assumption made? Were previous Mojave Airport events used or a study of a similar facility?

> ***FAA Response 1*:** It was assumed that each launch of a Concept A or B launch vehicle would add three spectator vehicles to the area. This is the expected average number of spectator vehicles over the life of the proposed action. The novel nature of these launches may initially attract more than three spectator vehicles, but it is expected that once these launches become routine there will be less spectator interest.

1.2 Comment 2 [Editorial]

On page 74, you have referred to Kern Council of Governments as Kern Council of Government.

> ***FAA Response 2:*** The Final EA includes the requested change.

1.3 Comment 3 [Editorial]

On page 76, you state construction for a realignment of State Route (SR) 58 was underway. The realignment of SR 58 has been completed and is in use.

> ***FAA Response 3:*** The Final EA includes the requested change.

2.0 Gayle J. Rosander, State of California Department of Transportation

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY ARNOLD SCHWARZENEGGER, Governor

DEPARTMENT OF TRANSPORTATION
District 9
500 South Main Street
Bishop, California 93514
PHONE (760 872-0785
FAX (760) 872-0754
TTY (760) 872-9043

Flex your power!
Be energy efficient!

November 24, 2003

Ms. Michon Washington
FAA Environmental Specialist
Mojave Airport EA
c/o ICF Consulting
9300 Lee Highway
Fairfax, Virginia 22031

File: KER
CNSLT ND
SCH #: 2003114001

Dear Ms. Washington:

Consultation Process on Proposed Negative Declaration (ND) for East Kern Airport District Application for Launch Site Operator License for Mojave Airport

The California Department of Transportation (Department) appreciates being consulted on the proposed ND for the license for the Mojave Airport.

We have the following comment concerning the proposed project:

- Although it appears that there will be no direct impacts to state transportation facilities, travelers could be distracted and alarmed were they to see launched rockets. Provisions should be made for notification of launch possibilities in the vicinity (public education, signage etc.).

Please continue to forward relevant information on this proposed project. If you have any questions, please contact me at (760) 872-0785. We value a cooperative working relationship in matters concerning Eastern Kern County.

Sincerely,

Gayle J Rosander

GAYLE J. ROSANDER
IGR/CEQA Coordinator

c: Scott Morgan, State Clearinghouse
Terry Gess, California Department of Transportation

"Caltrans improves mobility across California"

2.1 Comment 4 [Safety]

Although it appears that there will be no direct impacts to state transportation facilities, travelers could be distracted and alarmed were they to see launched rockets. Provisions

should be made for notification of launch possibilities in the vicinity (public education, signage etc.)

FAA Response 4: As stated in section 2.1.2.3, the aircraft carrying the Concept A launch vehicle would take off horizontally. The launch vehicle would be released at an altitude between 16 to 20 kilometers (10 to 12 miles), at which point the rocket engine would be ignited. As stated in section 2.1.3.3, the Concept B launch vehicle would also take off horizontally. Although the rocket engines would be ignited on the ground, the vehicle would still takeoff like a traditional airplane. As stated in section 5.11.1, the design of Concept A and B launch vehicles would resemble traditional airplanes while in flight. It is not expected that the launch of either Concept A or Concept B launch vehicles would create a distraction to travelers because the area is already used for horizontal takeoffs. Notices to Airmen would be issued prior to all launch events, which would notify airmen to the areas in which the launch vehicles would be operating.

3.0 Bill Deaver, Mojave Town Council

3.1 Comment 5 [Miscellaneous]

Mojave Town Council - Mojave Chamber of Commerce
P.O. Box 999
Mojave CA 93502
661.824.8417

December 5, 2003

Ms. Michon Washington
FAA Environmental Specialist
c/o ICF Consulting
9300 Lee Highway
Fairfax VA 22031

Dear Ms. Washington:

The Mojave Chamber of Commerce and the Mojave Town Council fully support the efforts of the East Kern Airport District to have Mojave Airport certified as a Spaceport. Certification as a Spaceport will allow businesses already operating on the airport to continue their efforts to expand the envelope of human knowledge.

Some seven companies involved in developing rocket engines, space vehicles, and other aspects of space operations are already operating on Mojave Airport. Between them they provide employment for up to 200 people, making significant contributions to the local and regional economies. This economic impact is especially relevant in a community faced with losing jobs due to the recent re-routing of Highway 58 around our town.

Designating Mojave Airport as a spaceport will, in our view, have a positive rather than negative effect on general aviation and the other aerospace operations at Mojave Airport. Spaceport operations will primarily involve aircraft landing and taking-off, just as they do now. The big difference will be that some of these landings will involve vehicles returning from space rather than, say, Las Vegas or San Diego.

Mojave is a town which is home to two major railroads, two busy highways, and aircraft of all types operating from the local airport and flight test centers at Edwards, China Lake, and Palmdale, a place where sonic booms were first heard and quickly dubbed "The Sound of Freedom." When traffic was diverted from Highway 58 to the new freeway recently, the resulting silence represented the loss of jobs.

We commend the far-sighted vision of the members of the East Kern Aircraft District board and its General Manager, Stuart O. Witt, for seeking spaceport certification from your agency. We ask that you approve this request and let the innovative pioneers who are our friends and neighbors get on with the business of reaching for the stars.

Sincerely yours,

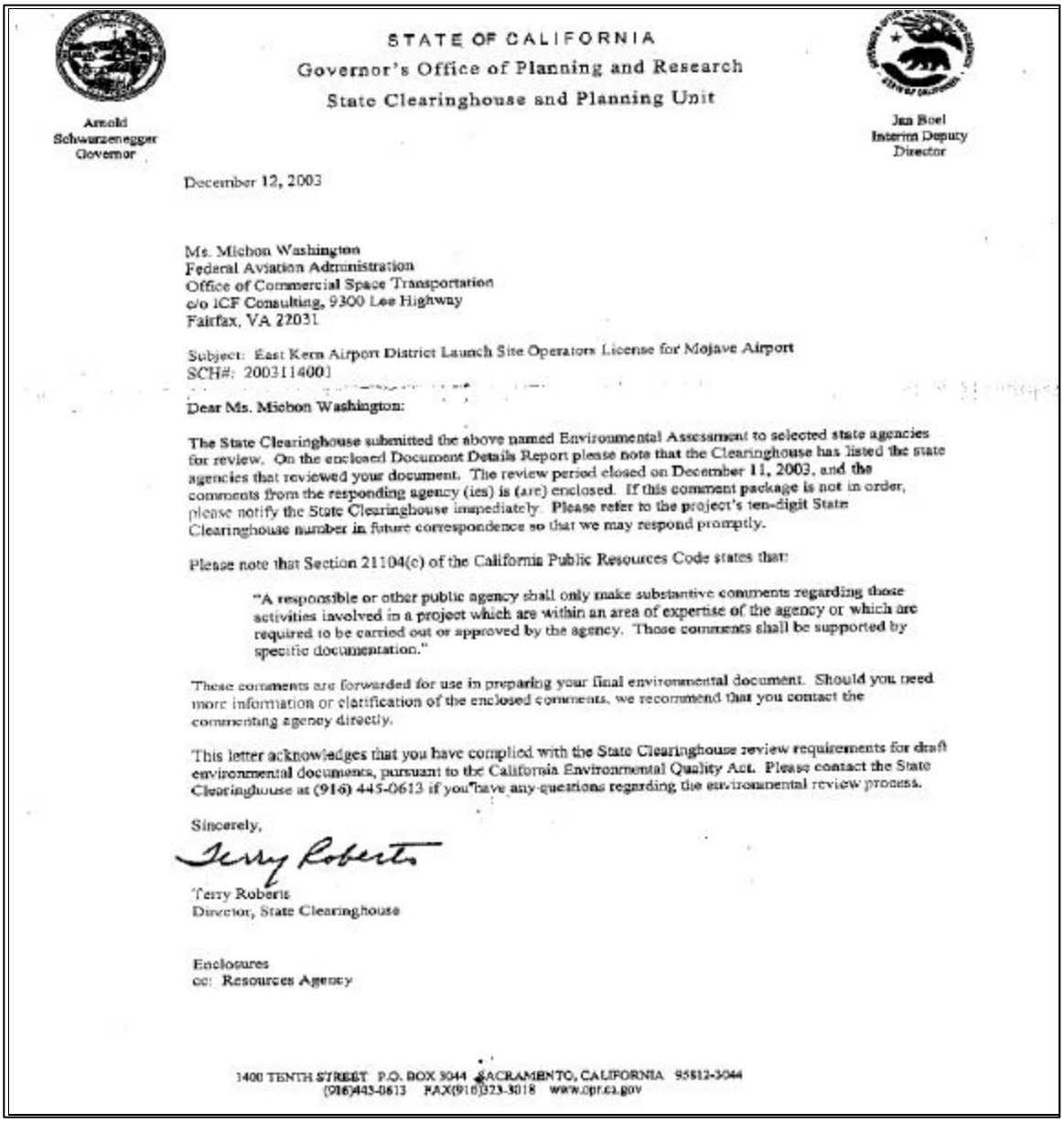
William H. Deaver, President
Mojave Town Council

Mojave Chamber of Commerce

FAA Response 5: Thank you for your comment.

4.0 Terry Roberts, State of California Governor's Office of Planning and Research State Clearinghouse and Planning Unit

4.1 Comment 6 [Miscellaneous]



STATE OF CALIFORNIA
Governor's Office of Planning and Research
State Clearinghouse and Planning Unit

Arnold Schwarzenegger
Governor

Jan Boel
Interim Deputy Director

December 12, 2003

Ms. Miebon Washington
Federal Aviation Administration
Office of Commercial Space Transportation
c/o ICF Consulting, 9300 Lee Highway
Fairfax, VA 22031

Subject: East Kern Airport District Launch Site Operators License for Mojave Airport
SCH#: 2003114001

Dear Ms. Miebon Washington:

The State Clearinghouse submitted the above named Environmental Assessment to selected state agencies for review. On the enclosed Document Details Report please note that the Clearinghouse has listed the state agencies that reviewed your document. The review period closed on December 11, 2003, and the comments from the responding agency (ies) is (are) enclosed. If this comment package is not in order, please notify the State Clearinghouse immediately. Please refer to the project's ten-digit State Clearinghouse number in future correspondence so that we may respond promptly.

Please note that Section 21104(c) of the California Public Resources Code states that:

> "A responsible or other public agency shall only make substantive comments regarding those activities involved in a project which are within an area of expertise of the agency or which are required to be carried out or approved by the agency. Those comments shall be supported by specific documentation."

These comments are forwarded for use in preparing your final environmental document. Should you need more information or clarification of the enclosed comments, we recommend that you contact the commenting agency directly.

This letter acknowledges that you have complied with the State Clearinghouse review requirements for draft environmental documents, pursuant to the California Environmental Quality Act. Please contact the State Clearinghouse at (916) 445-0613 if you have any questions regarding the environmental review process.

Sincerely,

Terry Roberts

Terry Roberts
Director, State Clearinghouse

Enclosures
cc: Resources Agency

1400 TENTH STREET P.O. BOX 3044 SACRAMENTO, CALIFORNIA 95812-3044
(916)445-0613 FAX(916)323-3018 www.opr.ca.gov

FAA Response 6: Thank you for your comment. The referenced attached comment is included as Comment 4 in this document.

5.0 Oral Comment Received from Mr. Dick Rutan, East Kern Airport District

5.1 Comment 7 [Miscellaneous]

My name is Dick Rutan, and I'm a -- what am I? -- the Director of -- I've just been elected to the Board of Directors for the East Kern Airport District and a long time resident. And my comment is -- is that I would like to -- to urge AST -- before I say that -- right -- we are on the -- this is an emerging industry, a rapidly developing, exciting industry with potential that we can't even imagine. And I would urge AST to develop an attitude of cooperation and support this industry and not bury it in bureaucratic minutia.
Thank you.

FAA Response 7: **Thank you for your comment.**

6.0 Oral Comment Received from Ms. Cathy Hanson, East Kern Airport District

6.1 Comment 8 [Miscellaneous]

I'm Cathy Hansen, resident of Mojave and on the Board of Directors for the East Kern Airport District. And I just -- this is so exciting because we're just on the edge of the future, and the very idea to become the first space port is very exciting. I know that people will say, "Aren't launches usually made out over the ocean? And you're so far inland." "Yes. That's right." And that's what makes it so exciting that the -- the space craft that are launched here can either launch from the ground or be dropped from another aircraft. Of course, I'm very supportive of it because we need to look to the future. I have grandchildren that will come running into the house and say, "Grandma, look what's up there." And they get very excited when they see a Burt Rutan-designed airplane. They always know it's one of Burt's airplanes. But that is the future. And I look at that excitement with these kids and think, "We need that kind of excitement as adults." So yes, I'm in favor of it. Thank you very much for having this hearing.

FAA Response 8: Thank you for your comment.

This Page Intentionally Left Blank

INDUSTRIAL ORGANIZATION

7.0 Oral Comment Received from Ms. Aleta Jackson, XCOR Founder

7.1 Comment 9 [Miscellaneous]

Aleta Jackson, Mojave resident. I'm also a member of the Chamber of Commerce and founder of XCOR Aerospace. I'm in favor of this, as you might imagine, because I think not only will it keep me in beans and worms, it will be a great benefit and boom to the area and to national security.

FAA Response 9: Thank you for your comment.

PUBLIC CITIZENS

8.0 Mr. John Gardner

8.1 Comment 10 [Miscellaneous]

We are 100% for the proposal.

FAA Response 10: Thank you for your comment.

9.0 Mrs. Patty L. Gardner

9.1 Comment 11 [Miscellaneous]

Very excited about a Space Port. It will personally help our business and the advance of our children, grandchildren and great grandchildren.

FAA Response 11: Thank you for your comment.

10.0 Mr. Marvin Clague

10.1 Comment 12 [Miscellaneous]

Due to the very small number of other locations which may qualify based on nearby population densities, I urge that, in case of any marginal decision factors, consideration be given towards approval of the Mojave site. More sites, rather than fewer sites, are needed so that this new area of endeavor may prosper.

FAA Response 12: Thank you for your comment.

11.0 Mr. Rex Moen

11.1 Comment 13 [Miscellaneous]

Access to space for commercial vehicles is extremely important to the United States. Please remove obstacles to the EKAD to be a Spaceport!

FAA Response 13: Thank you for your comment.

12.0 Oral Comment Received from Mr. Don DeLong

12.1 Comment 14 [Miscellaneous]

I'm Dan Delong. I've been a Mojave resident for nine years, and I think Mojave is a great place to live. The town has just lost a significant revenue source in the building of a highway bypass, and I'm looking forward to this new industry that FAA can support to bring some more jobs back to Mojave instead of drying up and blowing away. Thank you.

FAA Response 14: Thank you for your comment.